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MOTOR AGE

CHILTON PUBLICATION

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

JANUARY
1939

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Gunning for Trouble with Gages

A follow-up to "Performance Requires Perfect Timing" which appeared last March. We'll be glad to have you "follow-up" with your comments on it.

Ford Model 40-B Distributor

Hang this one on your wall. It's another in the series of helpful service picture stories.

Adjusting the New Ford Brakes

Our technical editor crawls under for a look at the hydraulics and comes up with a story on their servicing.

Chrysler's "Fluid Drive"

A description of the "fluid flywheel" assembly on the first American car to adopt it.

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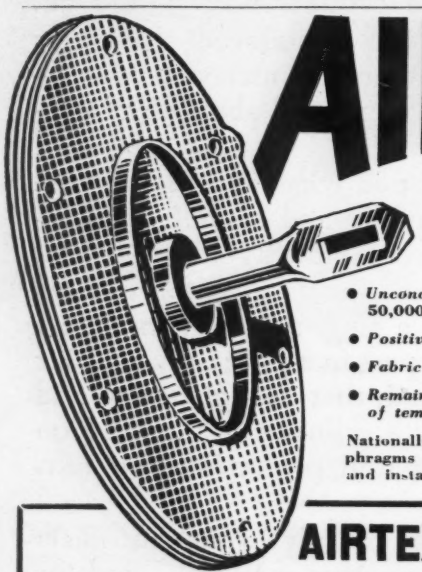

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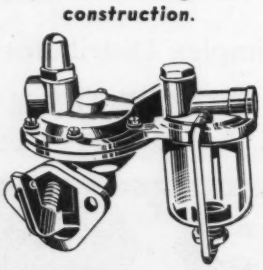

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MOTOR AGE

JANUARY 1939

SHOP TALK

Weighty Resolutions

Those mechanics who are in the habit of making resolutions are giving more weight to them than usual, realizing that with today's keener competition you can't pass up any bets. Consequently, they are making definite resolutions to provide a definite advertising appropriation, a routine cleaning program, and to use all equipment to its fullest capabilities, not only for doing the job, but also as a merchandizer of additional work.

Neck Sticker Outer

Well, I'm probably sticking my neck out a little further than usual with the article, "Gunning For Trouble with Gages," this month. It's a sort of sequel to the article, "Performance Requires Perfect Timing," which appeared in the March issue. I know Cal Crooks, who was 100 per cent for the method outlined in the March issue, will start panning me for this new article, for he already told me I was all wet when I wrote him the details of some of the methods I have outlined in this issue. However, I have tried them all, and they worked for me. Let's hear how youse guys make out.

Kicker

A. S. Noonan, of Utica, N. Y., in an epistle to ye editor waxes quite caustic, to say the least, in regards to an article on how to make bushings in a lathe, that appeared some time ago in these erudite pages. Noonan's main kick seems to be that in the article I made the bushing from solid stock instead of tubing, or bushing stock. Technically, you are 100 per cent right, Mr. Noonan, and my face would be quite erubuscent (I had to look that one up) if it weren't for the fact that the article was designed to teach lathe principles of boring and turning, and not just the method of making bushings. However, I'll be more careful in the next article to emphasize that principles rather than product are the prime consideration.

Indexer

Speaking of index systems, which we weren't, D. H. Burbridge, who hails from the Windy City, sent me a sample of the index system he has evolved for keeping tabs on the solutions offered for the Clearing House questions and also for the maintenance articles which appear in MOTOR AGE.

Tabber

Just to give you a helping hand, in the matter of keeping tabs on the many good things that have appeared in MOTOR AGE during the past year, Bert Pollock has prepared an index of the 1938 articles and other information which appears on page 28 of this issue. Incidentally, a similar index has been given in each January issue for the past two or three years.

Shopper

With only 15 days remaining to do his Christmas shopping, Horr, of Horr Service, in Crowley, Colo., wrote in wondering where he was going to get six hard, round, 59-cent dollars with which to purchase a new Flat Rate manual. And then, as he expressed it, he took the reindeers by their horns and proceeded to tell me what he hoped he would find in the next edition of Ye Old Flat Rate Manual. Well, Mr. Horr, your suggestions are swell, but if we followed them, it would take many more than six 59-cent dollars to pay for it. But when you get your copy let me know if you got your money's worth.

Bill Toboldt

Here are some high caliber methods to use when hunting trouble. Try them to see how they take the guesses out of diagnosing

By
BILL TOBOLDT

Gunning f

This is a follow-up to the article "Performance Requires Perfect Timing" which appeared in the March, 1938, issue of *Motor Age*. Whether you agree with us or not we'll be glad to hear your opinion of the statements made in this story. Drop us a line.

THE rapidity with which the automotive business is progressing is best shown by the constant change and improvements that are being made in trouble shooting equipment. For example the vacuum gage was relatively unknown up to a few years ago. Last spring an article appeared in MOTOR AGE suggesting the use of the speedometer or a tachometer in setting the ignition timing. At that time there were only two manufacturers producing a tachometer for that purpose. Since that time many more manufacturers are producing that kind of equipment—showing how the demand for such instruments has increased.

In the article in MOTOR AGE it was suggested that if a dynamometer, a tachometer or a vacuum gage was not available, the ignition timing could be set by means of the speedometer. The procedure was to jack up the rear wheels of the car and place the transmission in direct gear. Then, with half the spark plugs disconnected and the engine running at 30 m.p.h. the distributor is advanced and retarded until the highest reading is obtained on the speedometer. That setting would give the best performance and economy. If pinging resulted, it generally indicated trouble in the automatic advance or clogged carburetor jets.

What wasn't mentioned in the article was that in the case of the Ford V-8, it is necessary to hold the vacuum advance in the advanced position when setting the timing by this method.

As indicated in the article, a vacuum gage or an electric tachometer could be used in a similar method and would, of course, require only one man to perform the operation, and, in addition, would have considerably greater merchandising appeal to the customer. It must be emphasized that the vacuum gage or tachometer must be extremely sensitive to variations in engine speed, otherwise the setting will not be accurate.

However, in addition to setting the ignition timing, the same method can be used for other jobs. It can be used to locate weak cylinders, rough check of automatic spark advance carburetor idle adjustment, clogged carburetor jets, and some mechanics have even adjusted valve tappets by means of vacuum gage or tachometer.

In each case it is simply a question of making the particular adjustment in such a manner as to obtain the highest reading on the instrument.

When checking the automatic spark advance after first having correctly set the timing, the first step is to increase the engine speed to approximately 45 m.p.h. Note the reading of the vacuum gage, the tachometer or the speedometer

for Trouble with Gages

as the case may be. Now, advance the setting of the distributor. If the reading of the testing instrument increases, it indicates that the automatic advance is too slow. If the engine runs with a ping or slows down the spark is obviously too far advanced. If the reading remains the same, the spark is probably set correctly—though it might be too far advanced.

To compare the power of the different cylinders, the procedure is to cut out one cylinder at a time, a speed or vacuum reading being taken as each individual cylinder is cut out. Naturally, the lower the reading, the better the condition of that particular cylinder. If the reading is changed very little when a plug is shorted it indicates a weak cylinder which may be caused by leaking valves, blown cylinder head gasket, leaking pistons and rings or defective intake manifold gasket.

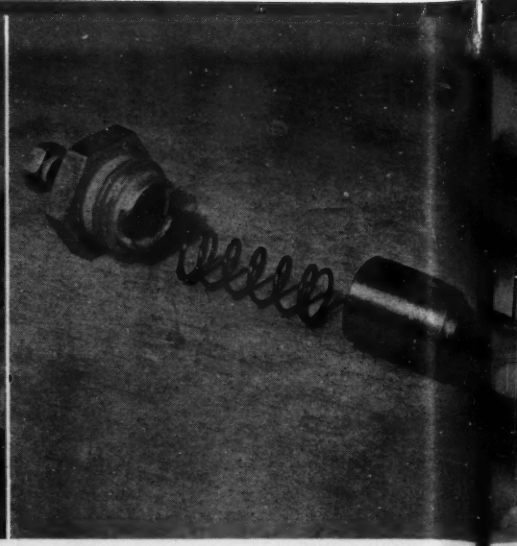
To determine whether the difficulty is lack of compression or a leaking intake valve guide, make a compression test. Then if the compression is up to standard on the cylinder that is weak, it indicates a leak at the intake valve guides or a leak at the manifold gasket.

In addition to setting the carburetor idle adjustment by means of a vacuum gage or tachometer, it is also possible to check the high speed jets. This is accomplished by first adjusting the idle and then making a second adjustment at an engine speed of approximately 30 m.p.h. If the engine speed increases when the idle mixture is made richer, it indicates that the jets are too small or clogged. If the speed decreases when the mixture is leaned, it indicates a jet that is too large, a

(Continued on page 64)

1—Remove advance adjusting screw and plate from side of distributor housing.

2—Remove vacuum brake retaining nut.

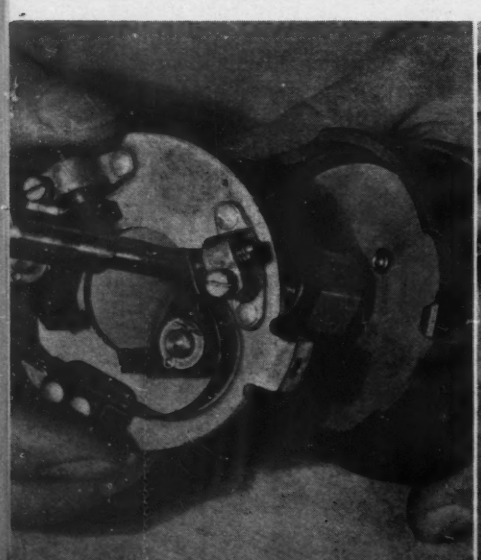


3—After removing vacuum brake retaining nut, remove the brake assembly.

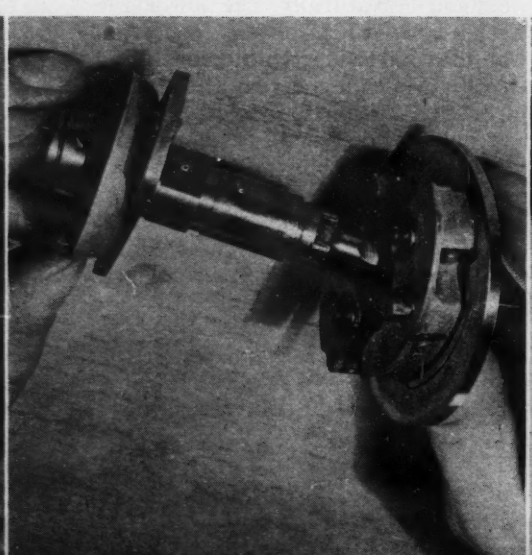
Servicing the

Ford Model 40-B

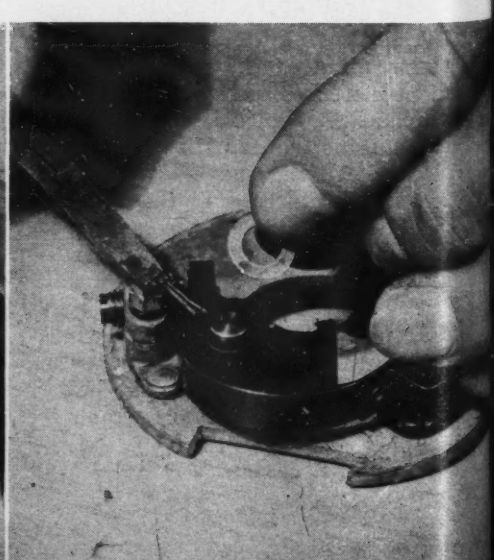
GENERAL—Clean all parts thoroughly with acetone or gasoline unit. Lubricate all friction surfaces with light grease designed for distributor to make sure vacuum brake operates properly. Advance



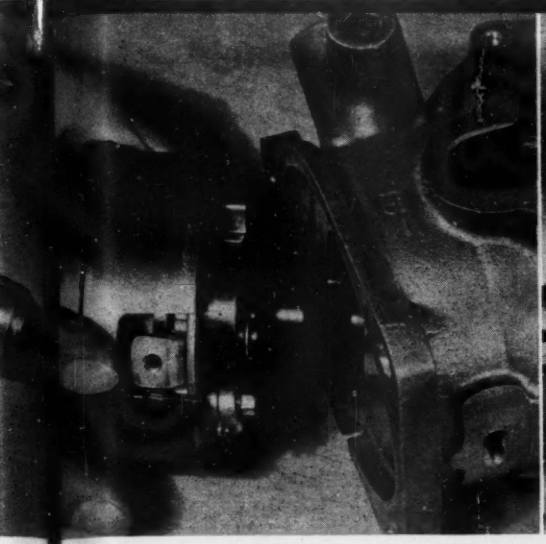
7—Remove breaker plate assembly from breaker housing. Distributor shaft may now be removed from breaker housing.



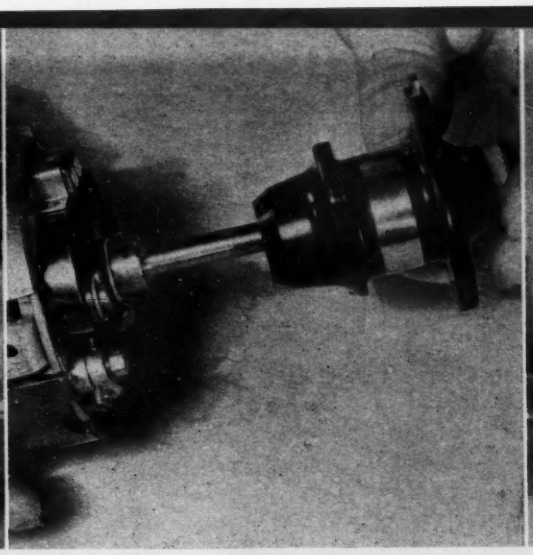
8—Remove lock ring shown by arrow in Fig. 6, then remove cam and governor weight assembly from shaft. Examine governor weights and springs for free operation, also for broken or weak springs.



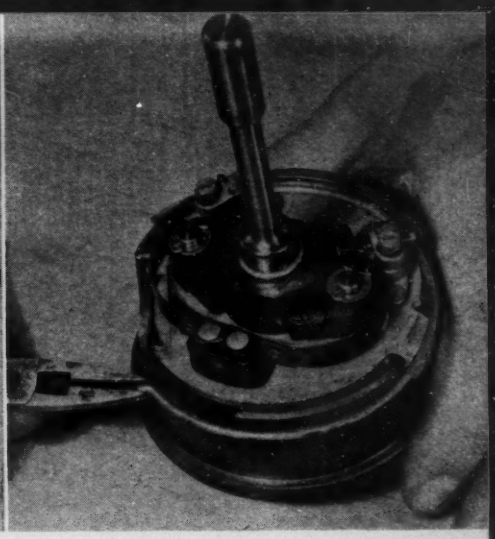
9—Remove cotter pins and washers from movable contact fulcrum posts.



4—Next, remove distributor shaft and breaker plate assembly from distributor housing.



5—Remove rotor from distributor shaft.



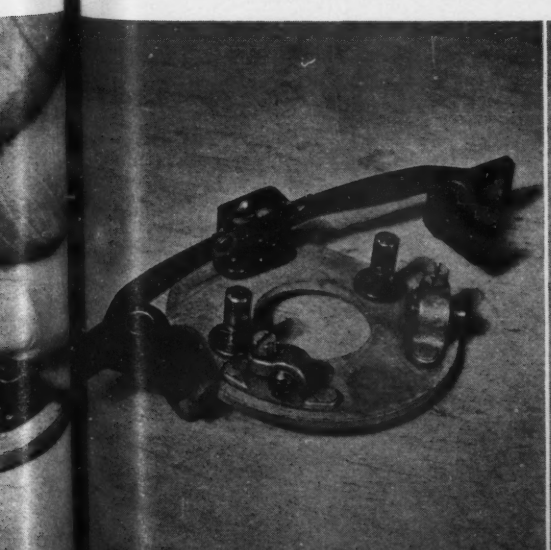
6—Remove breaker plate retaining spring ring.

By ***BOB TURNER***

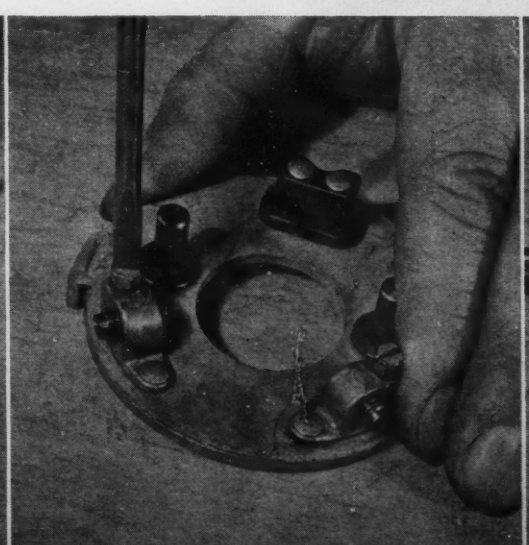
B Distributor

If bushings are worn excessively, exchange this purpose. Check vacuum connections to plate and vacuum brake may be set by test.

13— After reassembly of parts to breaker housing set breaker points as shown. Breaker points should be set to .012 in. to .014 in. To reassemble — reverse foregoing procedure.



10—Remove movable contact point assembly from breaker plate.

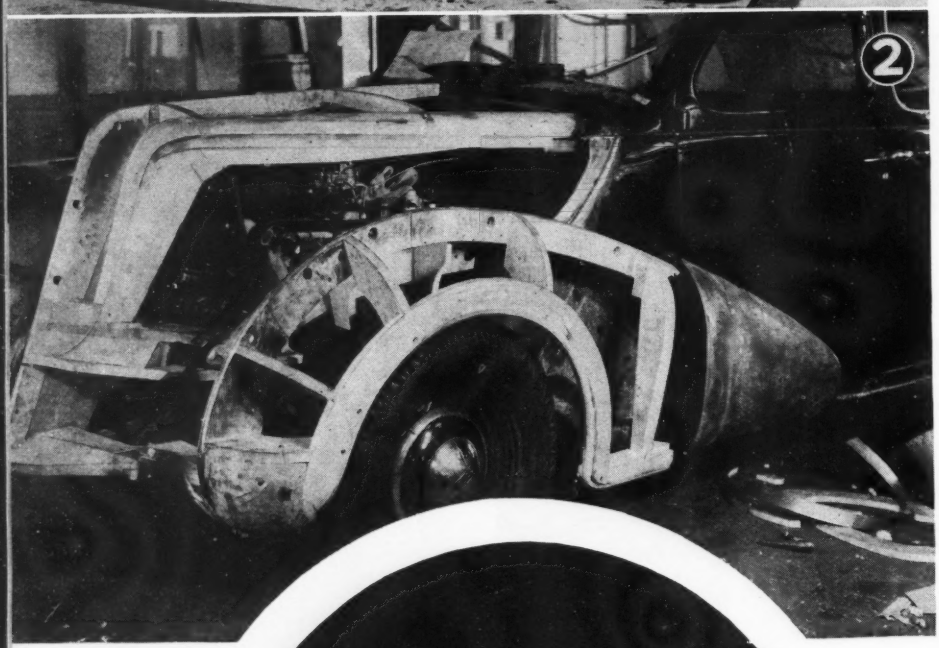


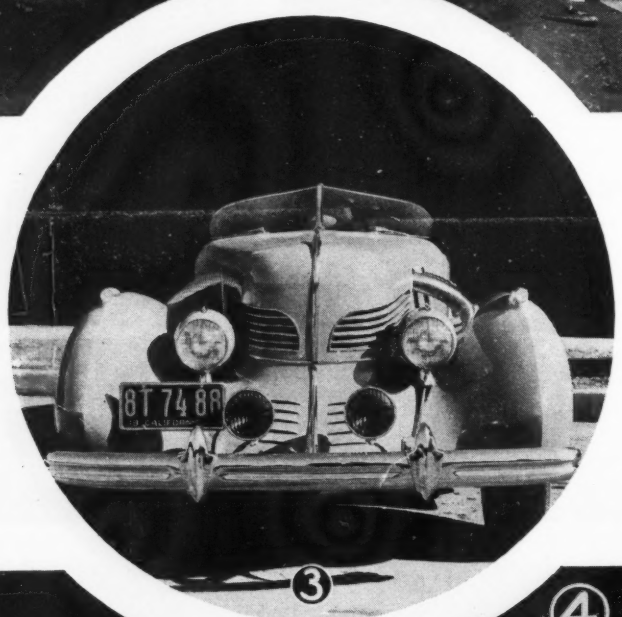
11—Loosen stationary contact lock screws.

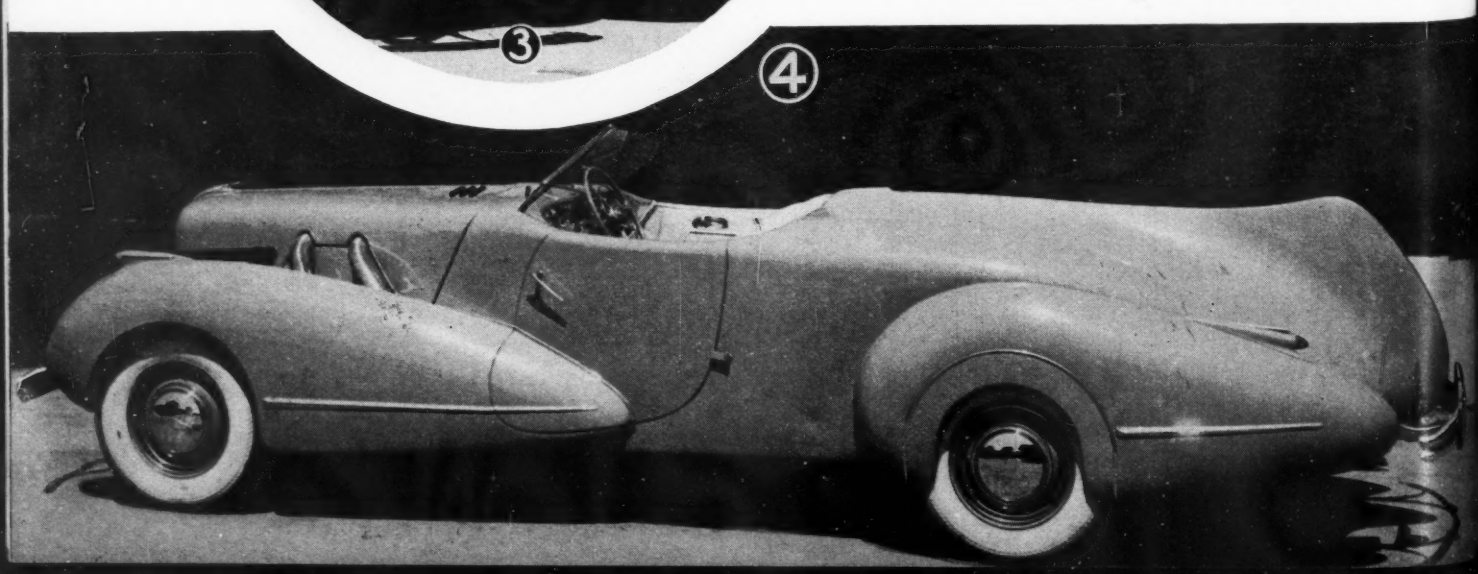
12—Remove stationary contact points from breaker plate.

Tailor

BY
R. DEWITT MILLER







"I WANT a car with a hidden safe, a cuspidor, gold handles on the doors, a toilet, and a trap door so I can sneak out to shoot deer. Oh, yes, I want a place to hide my gun so the game wardens can't find it when I get in their territory. How soon can you have it?"

The chief designer for Hollywood's Bohman and Schwartz, coach building shop which specializes in constructing automobile bodies to fit any purpose, is accustomed to such assignments.

In a few days the purchaser will call again to see the preliminary sketches. By this time he may

1. A new weapon in the eternal war against crime, but just another problem to the special body builder. The sliding trap door in the roof allows the use of a rifle against an escaping criminal. The idea was conceived by a Hollywood police officer and the design worked out by Bohman and Schwartz, special body builders. 2. A special job in the making. Because

Made Transportation

Serviceable or screwy, this firm builds auto bodies to suit its buyers' whims

have added a few things like a fully equipped bar and a concealed ice chest.

When he finally decides there's nothing else to be added, he will probably say, "But that is really an awful lot of stuff to get into one car. I wish I could have some idea what it would look like—it'll probably be as big as a ten-ton truck!"

He will be called in a day or so to see what it *will* look like. This is accomplished with the aid of a special blackboard designed by Bohman and Schwartz to overcome the average person's inability to visualize a car from drawings or plans. This blackboard is large enough to allow a full-sized outline of a car to be drawn on it. In this way the purchaser can see exactly how high the car will stand, how streamlined it will be, the location of the doors, etc.

Occasionally a miniature of the car will be built, which will include every detail from the instrument panel to the kind of bumpers the car will have.

One of the most famous cars built by this company was the so-called "Throne Car" for Father Divine. The purchaser of the car was known to the organization only as "John the Baptist." Throughout the whole transaction no other name was used. It was the *John the Baptist file, John the Baptist contract,* and the car was delivered to John the Baptist—for $22,500, in cash.

There were a lot of things about which John the Baptist couldn't seem to make up his mind. When the job was finally finished, the "throne" had evolved into two huge upholstered chairs which occupied most of the tonneau. The car could go more than 100 m.p.h.

Screen actors and actresses are often as individualistic in their cars as their clothes. A young lady entered the shop one day.

"I want my car upholstered to match the shoes I'm wearing," she said very definitely.

The shoes were made from the skin of a diamond backed rattler. There was some discussion, but the girl knew her own mind, so the order stood. It was snakeskin upholstery she wanted, and snakeskin she got. She usually rides alone.

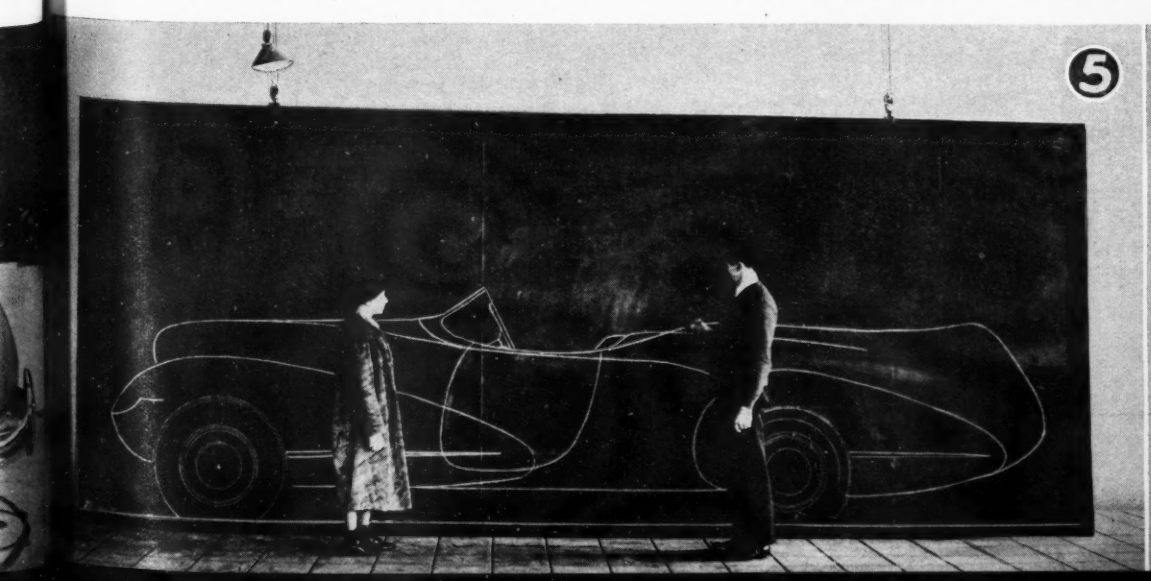
Another young lady of the movies wanted an unusual paint job. "Something different," she said. "Couldn't you make it look like mother-of-pearl?"

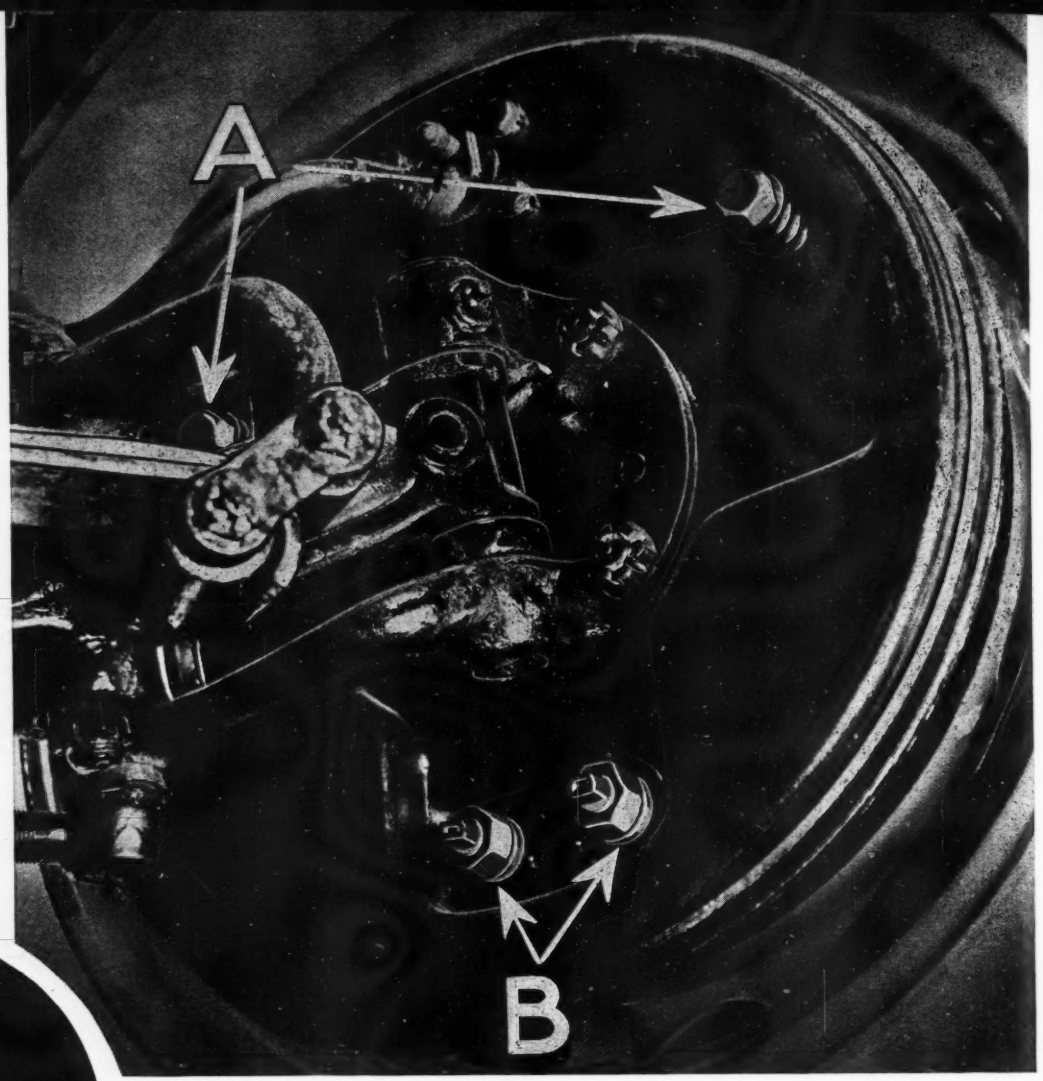
A finish was finally concocted whose principal ingredient was fish scales. When dry, it produced a beautiful opalescent effect.

Jewel cases have been hidden every place from the roof to the motor. One method is to equip a car with two batteries, placed on

(Continued on page 54)

of the individualistic nature of all work at Bohman and Schwartz, dies are seldom used. Sheet metal is hammered into the shape desired. 3. This car was built to be driven by a ghost. The script of the motion picture, "Topper," which was produced by Hal Roach studios, called for an ultra swank car which must appear to drive itself. To accomplish this, a special steering wheel was built on the floor and the motor arranged so that a concealed stunt man could have a clear view of the road through the radiator. All in the day's work for Hollywood's special body builder. 4. This is the way the "ghost car" looked to startled motorists as it sped, apparently without human guidance, through the streets. 5. A bit of psychology and a huge blackboard allow the prospective purchaser at the special body shop to get a life sized idea of his car even before work is begun on it. Cables pull the blackboard out of the way when not in use. 6. This meticulously accurate three-foot scale model helped a movie actress to visualize the car which was later built for her in Bohman and Schwartz' special body shop.





BY
BOB HANKINSON

Adjusting the

Recommended procedure calls for clearance adjustment before anchor adjustment

(Above) A rear view of the brake backing plate, showing the clearance adjusting cams and the anchor adjustment.

(Opposite page, left) Details of the rear brake, showing the actuating linkage for the hand brake which operates the service shoes on the rear wheels only.

(Opposite page, right) Details of the adjustment controlling the free movement of the brake pedal.

THE big news of the 1939 models is the adoption of hydraulic brakes on Ford and the new Mercury cars. These brakes are popularly known as Lockheed hydraulic units, while the Lincoln Zephyr has hydraulic brakes of the Bendix type.

Stepped cylinders are used at both the front and rear wheels of the Ford and Mercury cars, with the larger cylinder toward the front in each case. Front cylinders have diameters of 1¼ in. and 1 in., while the rear cylinders are 1⅛ in. and 1 in. The arrangement provides 55 per cent of braking effort on the front wheels and more equal shoe wear is claimed.

Of particular interest to the service field is the fact that in the adjusting procedure advocated by Ford, the clearance adjustment is made first and then the eccentric anchor; which is, of course, the reverse of the procedure used for

years by experienced mechanics.

The method as advocated by the Ford Company in a recent service bulletin when making a minor adjustment is as follows:

1. With the wheels installed and free of the floor, turn the cam "A" for the forward shoe until the shoe is tight against the drum.

2. Then just barely move it back until the wheel turns freely by hand. This is a cam and the slightest movement will establish clearance. No set amount of clearance is specified for these brakes as the least amount possible is most desirable.

3. Repeat steps "1" and "2" on the reverse shoe.

4. Repeat steps "1," "2" and "3" as outlined above at other wheels.

5. Check pedal reserve. If pedal reserve is less than half of the total travel but feels firm, the clearance is still excessive; repeat above operations, being careful in backing off the cams. If the pedal feels spongy, bleeding will be necessary.

6. The correct adjustment is when pedal has ¼ to ½ in. free movement measured at the pedal pad. The adjustment of the pedal rod is important in that excessive lash of the pedal represents a loss of pedal, while on the other hand too little or no lash at the pedal pad might result in the master cylinder piston resting on the pedal rod rather than on the stop provided. This would mean that the released position of the master cylinder piston would be toward the rear and there would be a possibility of the rubber cup covering the by-pass port, having the effect of causing the brakes to seize.

7. It is not necessary to remove the clevis pin from the pedal rod in order to adjust the pedal lash. Adjust the length of the pedal rod by turning the back section of the rod "D" until the correct amount of clearance exists. This can be determined by feeling the free movement of the pedal while the mechanic is still in the car. When the correct amount of free movement has been established, tighten "C."

To make a major adjustment on Ford or Mercury hydraulic brakes, the method outlined in the Ford Service Bulletin is as follows:

1. Adjust clearance as outlined in paragraphs No. 1, 2, 3, and 4.

2. Loosen the anchor lock nut "B."

3. Apply 25 to 35 lb. pressure to the pedal. This pressure must be maintained throughout the adjustment.

4. With the above pressure applied to the pedal and using a wrench with a 3 in. handle turn the mark on the eccentric anchor "B" down gently until you feel the shoe touch the drum. Tighten the lock nut, making sure that the anchor is held as the nut is tightened.

5. Remove the pressure from the pedal and turn the wheel by hand to make sure that the shoe does not drag. If the shoe drags, repeat the above operation more carefully.

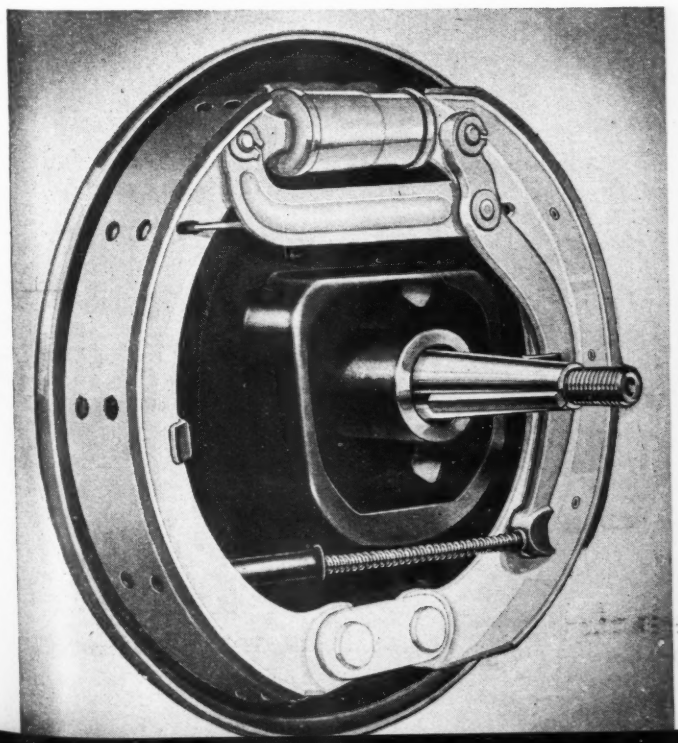
6. Repeat the above operation for each shoe at all wheels. The above procedure assures the clearance between the drum and the shoe at the bottom being less than the clearance at the top. As the linings wear, more wear will occur at the top so that there will always be more clearance at the top than at the bottom, once the anchors are properly set.

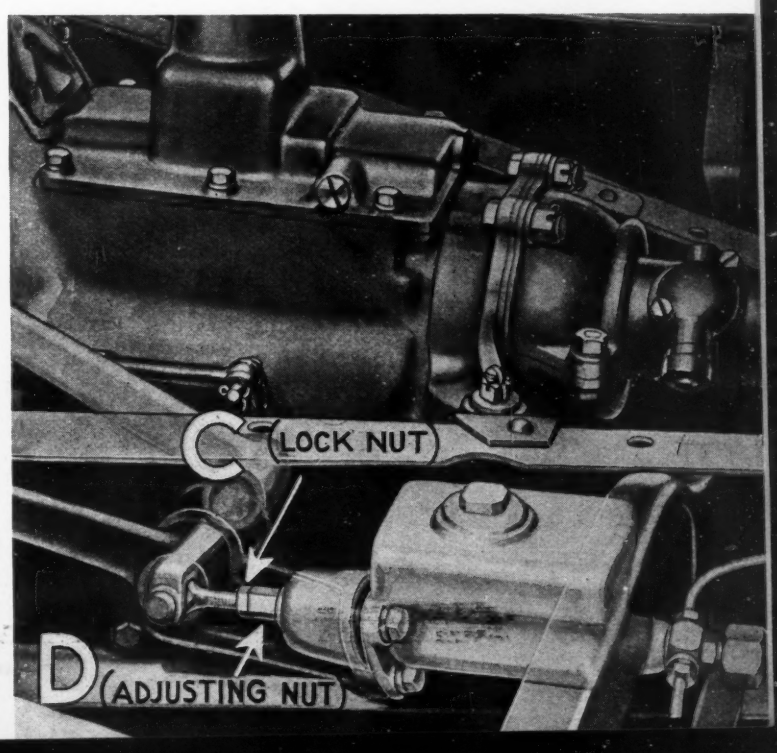
7. Adjust the pedal as indicated in paragraphs 5, 6 and 7 under minor adjustment procedure.

8. Road test the car.

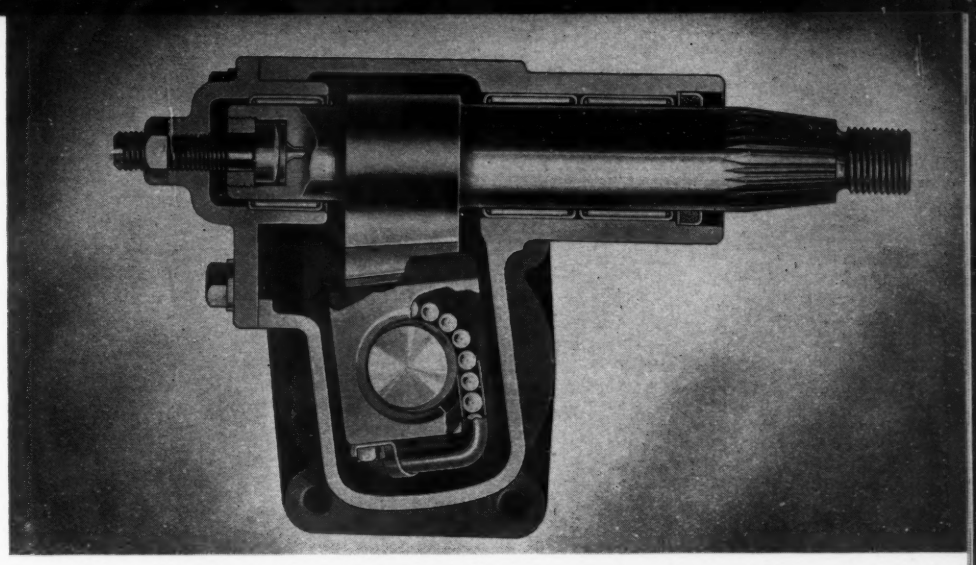
As mentioned in the beginning of this article, the adjusting procedure is that advised by Ford. However, many mechanics will continue to follow the usual procedure, which does not require the use of a pressure gage on the pedal depressor and which has produced a satisfactory adjustment in the past.

New Ford Brakes





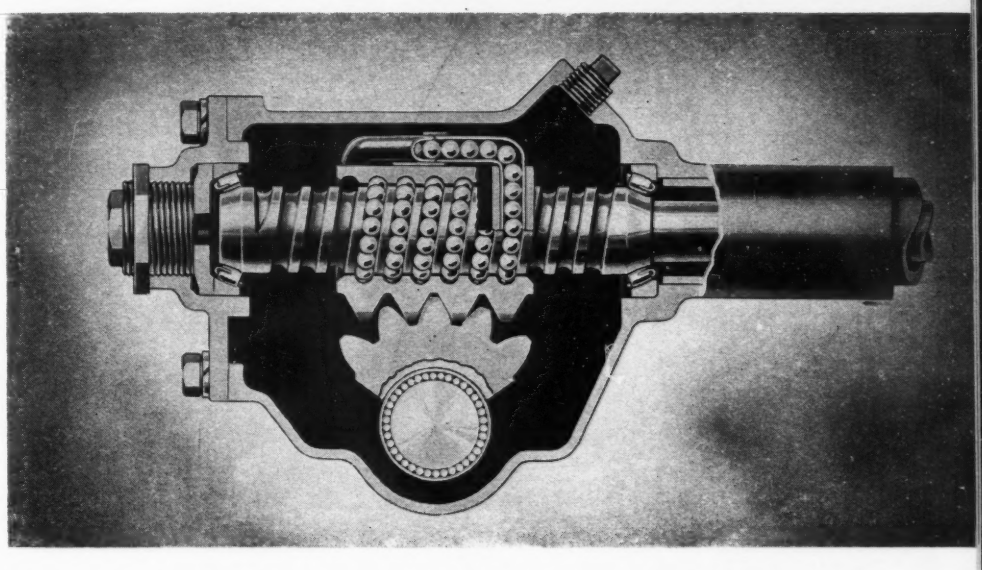
"This ain't business, lady—this is pleasure!"



(Top right) Ball-nut gear, section on pinion-shaft axis.

(Lower right) Ball-nut gear, section on worm axis.

Saginaw Ball-Nut Steering Gear



Combines characteristics of Ball-Bearing roller-tooth and worm-and-sector types

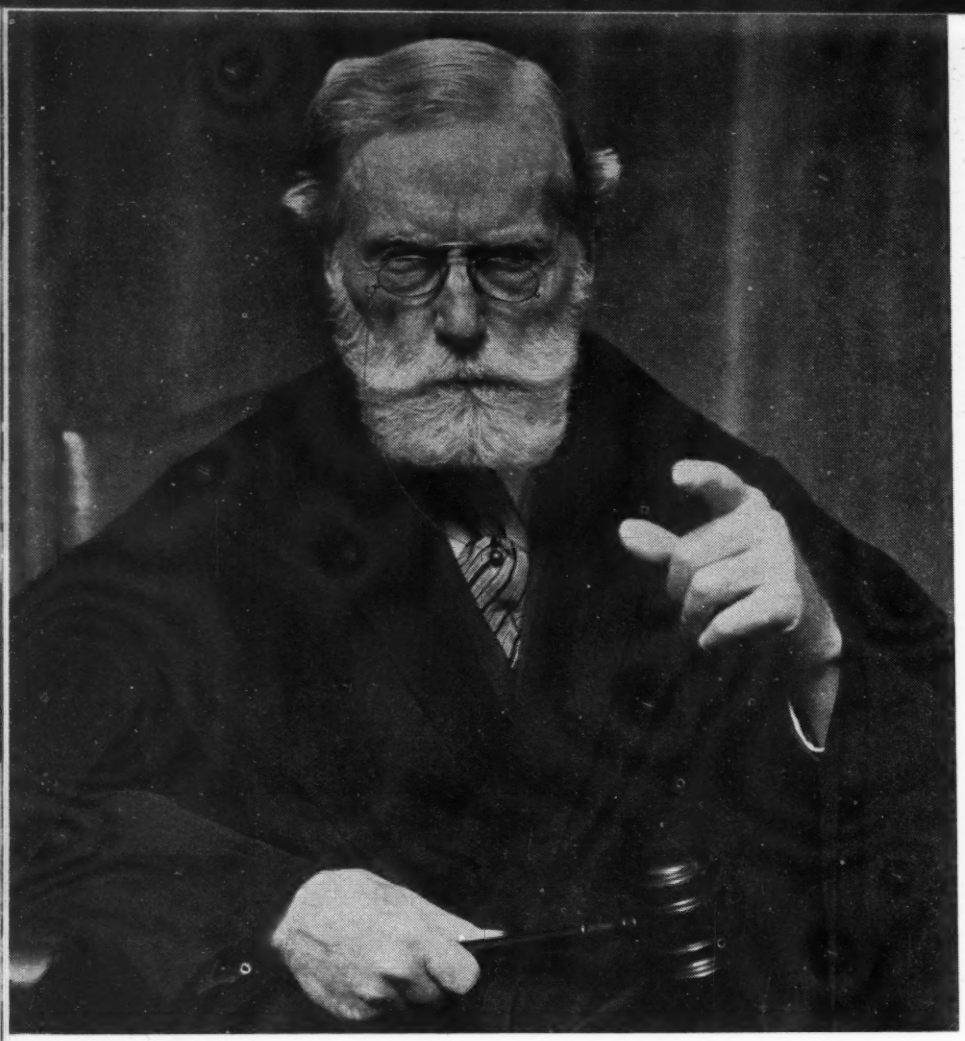
THERE has long been a search for a design of steering gear which would combine the efficiency and consequent steering ease of the ball-bearing roller-tooth gear with the heavy-duty characteristics of the worm-and-sector type in a reasonably-sized unit, and Saginaw Steering Gear Division believes it has the solution to this problem in its "ballnut gear," which is standard equipment on several 1939 G.M.C. trucks. It consists of a worm with a ground helical groove running within a nut with a similar ground groove, the grooves being filled with steel balls. The combination acts as a screw and nut with rolling instead of sliding motion between its parts. We are informed that under working loads efficiencies as high as 98 per cent have been attained.

The photographs reproduced herewith show the worm and nut, together with the ball-return tube which transfers the balls from one end of the nut to the other. This return tube is fitted into reamed holes in the nut, so located that the center line of the path of the balls in the tube intersects the center line of the path of the balls in the helical groove in a plane perpendicular to the tube and through the axis of the worm. The tube ends are milled off with a cutter shaped like the groove of the worm and set at the approximate helix angle of the groove. This removes that part of the groove which would interfere with the worm and leaves a finger that protudes into the groove and guides the balls in passing from the tube into the groove, and vice versa.

To convert the reciprocating motion of the nut into the desired rotary motion of a pitman-arm shaft, rack teeth are cut on the nut, and the pitman-arm shaft is made integral with a pinion meshing with this rack. It will be seen that contact between the rack and pinion is not normal, the rack being slightly tilted. This allows of the rack being moved into or away from the rack to allow for manufacturing variations and to compensate for wear in service. The rack is an ordinary straight-sided type, and the pinion is generated in a gear shaper, with the cutter head tilted at an angle with the work. The result of this is that the proportion between addendum and dedendum varies across the face of the pinion.

In order to allow for the normally greater wear on the surfaces in contact when the gear is in the central or "straight-ahead" position, the teeth are so cut that they mesh closely in the central position, but with a certain amount of backlash in off-center positions. It is said to have been found possible to reduce the backlash in off-center positions to a fraction of that found in the present type of hour-glass worm gears, which require excessive clearances to provide for wear resulting from small contact areas and high unit loads. Reduction of backlash in the off-center position

(*Continued on page 38*)



What the Law Says

-- concerning the repairman's right to sell his goods below cost to stimulate business

By
C. R. ROSENBERG, Jr.

SOME automotive men have been saying, a bit sarcastically, that the most important part of their equipment nowadays is a law library. It is dangerous, they insist, to make even a ten cent sale without looking up the law.

Sarcasm aside, it is true that much of the recent merchandising legislation, though intended to do away with objectionable selling practices, has of late become snarled in a maze of legal technicalities. Forty-three states and the Federal Government have passed laws permitting a manufacturer to fix retail prices on his trade-marked products, and those laws have been upheld by the Supreme Court of the United States. Seventeen states have enacted statutes prohibiting the sale of an item below cost, and a strong movement for similar legislation is under way in a number of other states. A California court ruled that loss leader legislation is unconstitutional. Later, the Supreme Court of California decided that loss leader laws are valid under certain conditions.

An automotive parts or accessories dealer located in any of the forty-three states with resale price maintenance laws may bank on it that a manufacturer can enforce a retail price on his trade-marked merchandise. That's safe legal ground for every automotive man in those states until and unless the Federal Fair Trade Act — also known as the Miller-Tydings law— is repealed.

But what of the laws prohibiting loss leader selling? Even the more favorable California decision admits that "it may well be that an absolute prohibition against selling below cost, regardless of the intent of the seller, would be unreasonable." (Wholesale Tobacco Dealers vs. National Candy and Tobacco Company, Supreme Court of California, No. 3390). Will the qualifying "intent" be sufficient to protect loss leader legislation when it comes before the United States Supreme Court for consideration?

One of the legal incidents of the ownership of any piece of property is the right of the owner to control it and dispose of it as he sees fit. Now if an automotive dealer acquires an item at a cost of $1.00. is it a violation of his constitutional rights for the state to prohibit him from selling that item for 80c., for example?

The first California decision said that it is and that, therefore, the California statute—and presumably any similar statute — prohibiting loss leader selling, is invalid because of unconstitutionality. Said the court:

"A very large number of authorities from nearly every jurisdiction in the land uniformly hold that it is a violation of the Constitutional rights of the owner of private property or of a lawful private business not imbued with a public interest, for the state to attempt to regulate the business or fix the selling price of the property, unless it becomes necessary to do so under the police power for the health, peace or welfare of the public. Such interference is destructive of the Constitutional inhibition and of private inherent rights to own and control property." (Balzer vs Caler, 74 Pacific Reporter, second series.)

In a later decision, however, the Supreme Court of California took the view that although a law which prohibited loss leader selling under any conditions might be invalid, the state nevertheless has the right to prohibit loss leader selling for the purpose of serving a legitimate social and economic end. The Cali-

(Continued on page 38)

Greater flexibility claimed for first American car with the "fluid flywheel"

CHRYSLER'S adoption of the "fluid flywheel," or "fluid drive," as standard equipment on the Custom Imperial marks the first appearance of this device on American-built cars. It is claimed to give a gasoline automobile the same flexibility that characterized the steam and electric vehicle, without the disadvantages that caused these media to be abandoned long ago for personal transportation.

The two revolving elements of the fluid drive are known as the driver and the runner. Power is transmitted from the driver to the runner through the medium of oil in motion; there is no mechanical connection between the driver and the runner, and consequently none between the engine and the rear wheels.

When the car is being driven by the engine the driver always turns faster than the runner. The difference between the rotary speeds of the two members, called the slip, is said to amount to only about 1 per cent in ordinary driving at normal speeds over a level road. When the pulling is hard the slip is greater, and it amounts to 100 per cent when the car is left in gear while the engine is running and the car is stopped. The advantages claimed for the fluid drive may be summarized as follows:

The car may be placed in high gear and normal traffic followed without declutching or shifting gears. The kickdown overdrive in conjunction with fluid drive gives virtually an automatic two-speed transmission in high gear. Declutching is unnecessary when stopping, as the engine will not stall. The clutch pedal is not sensitive, as in a standard car. Thus unskilled drivers have no difficulty in making smooth starts. The fluid drive damps all torsional vibration originating in the engine, and reduces shock and wear and tear on the whole driving train from the engine to the rear wheels. In addition the ride is smoother and shocks are greatly decreased when suddenly speeding up or slowing down. The car may be driven as slowly as desired in high gear without declutching, and there will be no engine thrashing or bucking.

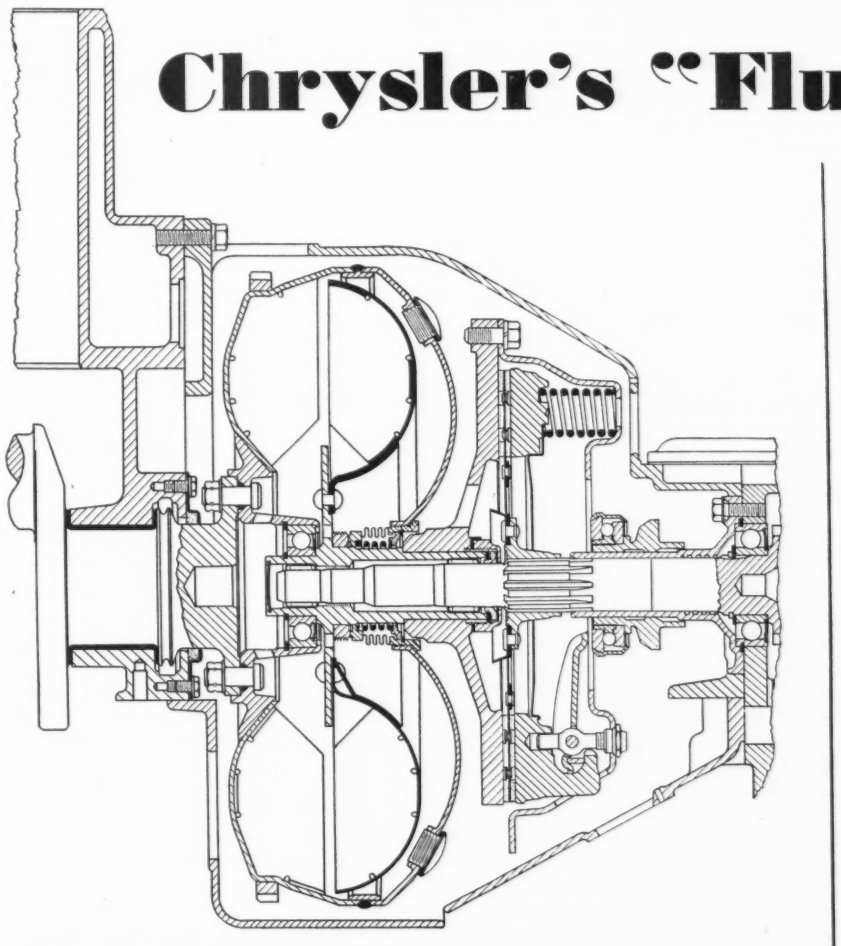
With the engine running, the fluid drive gives a no-back feature on a hill, as the car may be allowed to remain in gear and the throttle opened just enough to prevent the car from rolling backward.

The engine may be used as a brake just as in a standard car, and the fluid drive is equally efficient on drive and coast. The engine may be started by pushing the car in gear just as in a standard car.

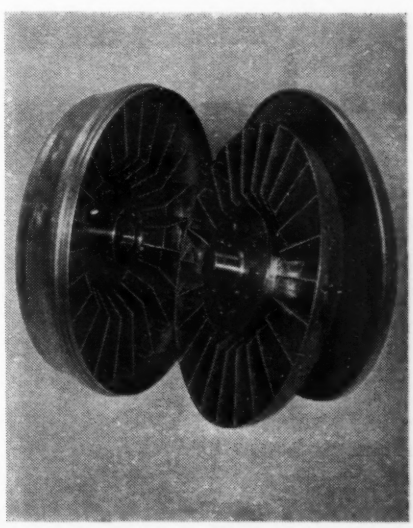
The fluid drive is made entirely of stamped, pressed, and forged

(Continued on page 64)

Chrysler's "Fluid Drive"



Sectional view of the Chrysler "fluid drive" assembly is shown at left, driver and runner, disassembled, are illustrated below.



Service Hints from The Factories

Inspector Leo Oberle, having just checked a steering knuckle at the Pontiac plant by the Magnaflux method for forging cracks, demagnetizes the part before it goes on through the various machining operations in the steering knuckle department..

Water Pumps

A neoprene water pump bearing shield has been added to the 1939 Pontiac water pumps at engine No. 6-502121 and 8-164131. This shield will also be used in all service water pump assemblies and will be made a part of the water pump bearing packages and water pump seal packages. Also instruction sheets in these packages will describe installation of this part. Dealers may procure this shield by ordering part 503282 to bring their stock of water pump shaft and water pump seal packages up to date.

The purpose of this shield is to protect the bearing from moisture which causes loss of lubricant and eventual wear and looseness in the shaft and bearing.

Attention is directed to Parts Release and Change Notice No. 121 in which a new low price has been established for Water Pump Bearing and Shaft Packages. These packages contain shaft and bearing seals, carbon washer and bearing shield.

Package Part 393788 is for all past model packless pumps and 1939 Eight. List $2.65—Dealer Net $1.60.

Package Part 503230 is for both 1939 Sixes. List $2.65—Dealer Net $1.60.

The new prices on these shafts will give the owner an exceptionally low price on water pump overhaul since the pump can be removed, overhauled, and replaced in 1.1 hrs.

"We'll have to tear it down again, Dr. Jones, we're short a set of sockets!"

Excessive Rear Axle Shaft End Play—1937 Studebaker Models

It may be necessary on a new car or when a new rear axle assembly is first put into operation, to adjust the rear axle shafts because of deflection of the brake backing plates.

When a condition of this kind is called to your attention the end play in the axle shaft should be reduced by the removal of shims. If end play reoccurs in a short period of time after it has once been removed it will be necessary to repeat the operation until the backing plate has taken a permanent set.

Service Hints From the A.E.R.A.

The following service suggestions were contained in a recent bulletin issued by the Automotive Engine Rebuilders Association:

Axle Shaft End Play

In service work on Chevrolet rear end assemblies it is necessary that the proper end play be allowed. To give this proper clearance try various axle shaft spacers so that there will be a free fit to a maximum clearance of .014 in. between the ends of the axle shaft and the spacer.

Lining Up Timing Gears on a Chevrolet Motor

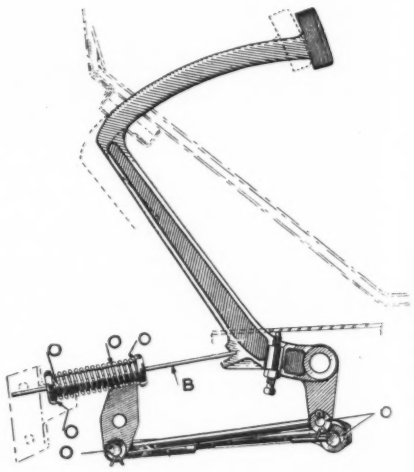
To line up the timing gears on a Chevrolet motor remove the camshaft and crankshaft gear, then place a new THRUST PLATE over the camshaft hole in the front end of plate, using a scale laid against the thrust plate and over the shoulder on the crankshaft. Check to see whether or not these surfaces are flush. If the scale strikes the shoulder on the crankshaft, add another gasket between the cylinder block and the front end plate. If there is space between the scale and the shoulder on the crankshaft, remove one gasket. Reinstall the crankshaft gear and camshaft, making sure the timing marks on the gears are in proper relationship.

Chevrolet Truck Information

Proper adjustment of the ring gear thrust pad on the 1½ ton Chevrolet truck is very important and to give this the proper adjustment it is necessary to loosen the lock nut on the thrust pad screw and tighten until it engages the back of the ring gear. Back this screw off ½ turn and tighten lock nut. This will provide .005 in. to .010 in. clearance between the thrust pad and back of gear.

Clutch Helper Spring Squeak — 1938

The clutch helper spring on 1938 Pontiac engines may squeak after the initial lubrication applied at the factory has washed or worn off. The



remedy is to thoroughly oil the parts, making sure that the felt on the strut "B" is saturated. Thoroughly lubricate at all points marked "O" in the illustration.

Transmission Grease Leaks

The clamp which retains the speedometer cable in place at the transmission on Studebaker cars when tightened too tight by some mechanics will cause the clamp to flatten out to a degree where its tension is lost, creating a leak at the gasket where the speedometer pinion is connected to the cable.

If a grease leak is encountered at this point, the clip should be checked, and if it is flattened a new clip and gasket should be installed.

THE READERS' CLEARING HOUSE

of

Service Men's Queries

Brakes Hang Up

On two occasions I have run up against the locking of hydraulic brakes —that is, one or two wheels—since I have come to this very cold climate. On both occasions I was only allowed to relieve the condition by relieving the pressure through the bleeding port. Can you give me the answer? Harry E. Wikoff, Wikoff's Ignition & Auto Repair Service, Cherry Valley, N. Y.

THERE are several causes that would contribute to this condition and one of them is the use of the wrong type of brake fluid for unusually cold weather. As you perhaps know, Lockheed makes two grades of brake fluid and so do almost all of the other brake fluid manufacturers—one for normal operation and one for unusually cold climates. If the weather is unusually cold (and how well I know that it gets cold up around Cherry Valley) you may find it necessary to recommend the winter grade of brake fluid.

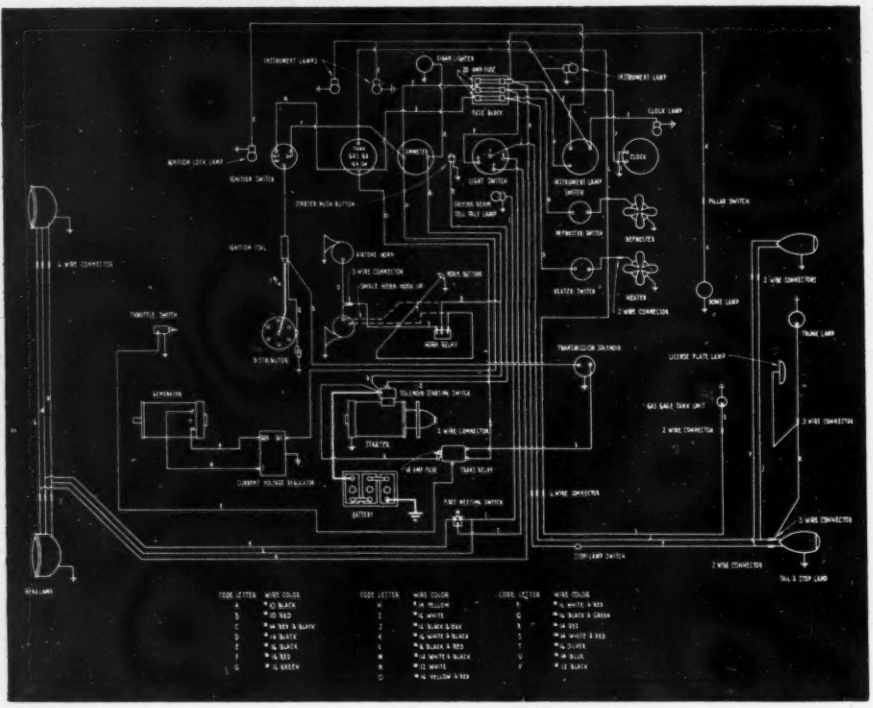
One of the common causes for brakes locking up is the use of an inferior grade of brake fluid or an attempt to dilute the regular fluid with some other liquid such as kerosene which causes the rubber cups to swell and block off the return ports so that the brakes do not completely release. In a case of this kind, the only thing you can do is to replace the rubber cups in the master cylinder and in the wheel cylinders, drain the entire braking system and refill with the proper grade of fluid.

Another condition that you might

(Continued on next page)

TROUBLE?

If you are stuck with a puzzling repair job that just won't turn out right, write to BILL TOBOLDT, Editor of MOTOR AGE. Each month we present here a few of the numerous queries received. We'll try to straighten out your problems for you. Don't cuss-write us!



1939 Studebaker Commander Wiring Diagram

encounter is that of the brake shoes sticking against the backing plate. This can be relieved by lubricating between the shoe and the backing plate with a special brake shoe lubricant which will enable the shoes to slide freely when they are expanding and contracting.

A further condition along this same line is the use of too weak brake shoe return springs. If the return springs do not have the proper tension to overcome the normal return of the shoes plus the drag due to the shoes having a tendency to stick against the backing plate, it will be necessary to install stronger springs.

I am sure you will agree that attempting to correct a condition of brakes locking by simply relieving the pressure through the bleeding port is by no means a permanent method of repair. Either one or more of the points listed above are responsible for this condition and they should be corrected to insure a permanent job.

Jumps Out of High

Please give me some advice on a 1931 De Soto that jumps out of gear when in high.

This car did not do this until we put in a clutch. We also put in a rear rubber mounting and have changed the position of the saddle but it still jumps. George T. Miller, M.&C. Garage, 126 Longnecker St., Buffalo, N. Y.

I AM quite sure that you will find the cause of the difficulty you are now experiencing with the 1931 De Soto which jumps out of gear, to be caused by misalignment. Just where the misalignment is—is rather hard to state, but the first thing I would do would be to slacken up all the cap screws connecting the clutch bell housing to the flywheel housing. Then, tighten them up evenly taking care to tighten the bolts diametrically opposite each other and in that way work around the housing.

If that does not overcome your trouble, there is a possibility that you bent the clutch shaft when you removed the transmission.

Incidentally, the factory instructions state that when dismantling this clutch you should take care to mark the clutch backing plate and the flywheel before dismantling so as to insure reinstalling the clutch in the same relative position to maintain the original balance. It is my belief that this would only result in vibration if it were not reinstalled in the original position, and would not have any material effect on the transmission jumping out of gear.

If realigning the clutch as I have outlined or the straightening or installation of a new clutch shaft does not overcome your trouble, I am inclined to believe that you will find the difficulty in worn transmission gears.

Grease Travels

We have a 1937 Chevrolet DeLuxe Model on which the transmission grease follows the drive shaft back to the differential. The transmission will be empty in 1000 miles and the differential will be too full. We have tried lighter grease but to no avail. The vent on top of the drive shaft tube is clean and open.

Please advise if there is an oil seal of any kind to stop this. Boscobel Motor Co., Boscobel, Wis.

ON your 1937 Chevrolet DeLuxe which continues to leak grease from the transmission into the rear axle, I would suggest that you replace the universal joint collar bushing at the front end of the torque tube and also the drive shaft bushing and oil seal which is in the torque tube.

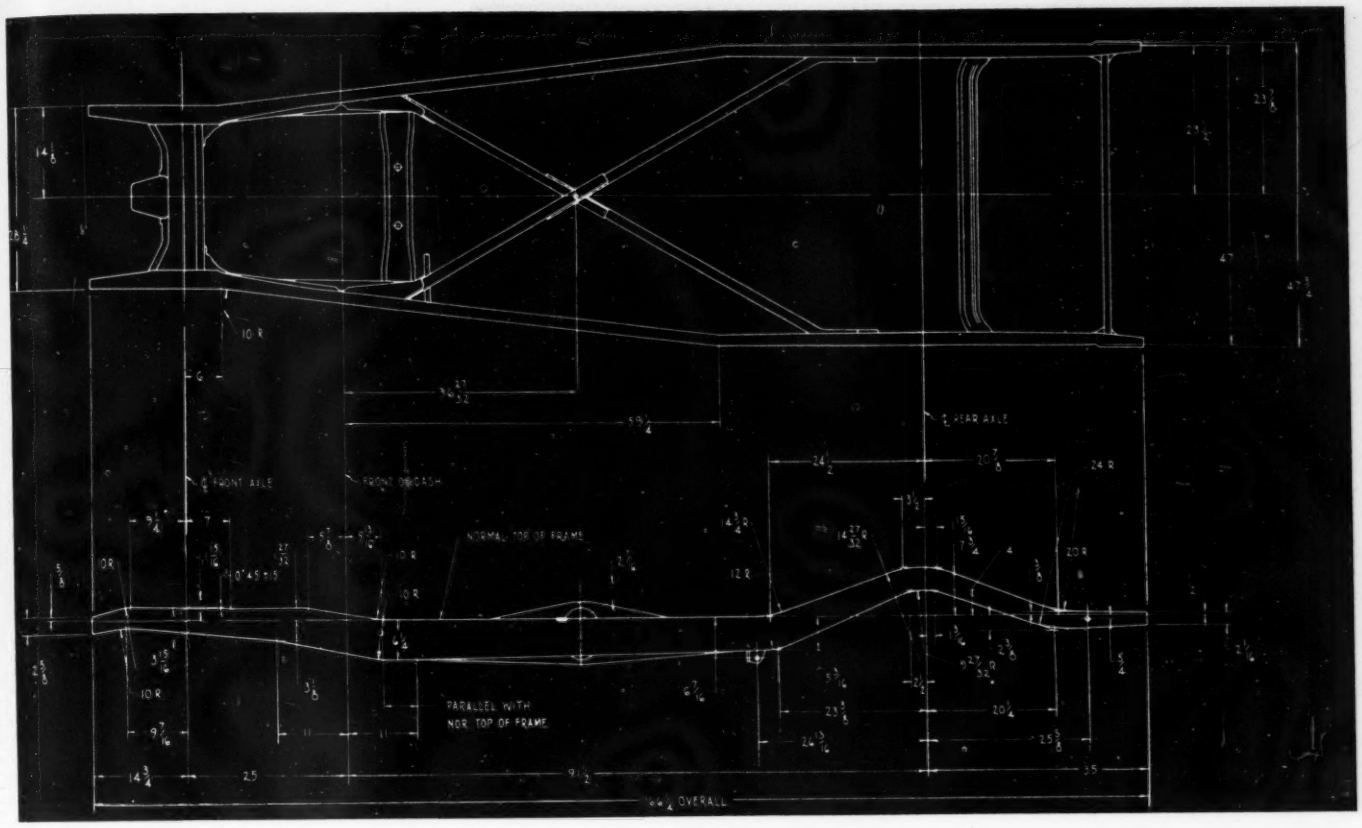
I am quite sure that after replacing these two bushings you will have no further difficulty.

Excessive Oil Consumption

I am writng you in regard to some trouble I am having with a 1929 Studebaker Six Commander. This car seems to use excess oil.

I purchased this car second hand and after getting it put it in the shop for a thorough going over. They found the block out about .025 so they rereconditioned that, put in very best piston rings they could buy, also valve guide packing. They did everything possible for a good job, but just as soon as I began driving, the first 140 miles I used two quarts of oil and it still uses oil. After about 1500 miles we changed rings. After breaking them in properly we had the same old story. The car uses a quart of oil in a hundred miles at 45 m.p.h. Gaskets are O.K. and packing on pan at rear

"Hey, bud, step on it. It's cold up here!"



Frame Dimensions 1939 Studebaker Commander.

main bearing is O.K. M. D. Haney, Miller's Firestone Service, Broken Bow, Nebraska.

THE first thing that I would suggest would be that you have an oil pressure test made on this car. In case your mechanics are not familiar with this test, I am sending you a reprint of an article which gives complete details. This test will show any points where oil may be leaking such as worn bearings, etc. Naturally, if your rod or main bearings have excessive clearance along the sides an excessive amount of oil will be thrown from the bearings, which the best make of rings will be unable to keep down.

You state that the block was reconditioned—but, it sometimes happens that the cylinders were not given a smooth enough finish and consequently rapid wear of pistons, rings and cylinder walls would result which would soon cause excessive oil consumption. I therefore suggest that you have the mechanics once more check to see what piston clearance they have and, if necessary, install oversize pistons.

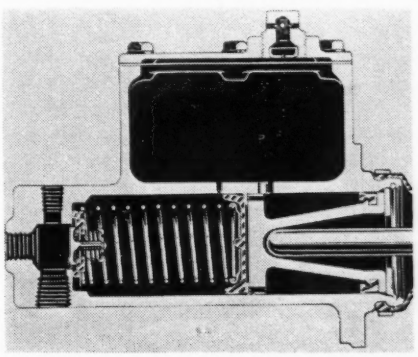
Additional suggestions will be found in the attached article and I suggest that you have the mechanics check each item carefully.

Many Stop-Light Switches

We are having trouble with a stop-light switch on a 1937 Plymouth. The original switch went bad when the car was about five months old and since then we have replaced four. This trouble appears when they have been in service from three to four weeks. I would like to know what the trouble is. We can't find anything wrong. L. J. Kauffman, Houston Auto Repair Co., 2904 Washington Ave., Houston, Texas.

THERE are three possible causes for this condition. First, the stop-light switches that you have been getting are of an inferior grade and simply will not stand the gaff for more than three or four weeks. Second, the check valve in the master cylinder may be too strong, maintaining a constant pressure in the brake lines and, therefore, exerting enough pressure on the stop-light switch to keep it in the "on" position. Third, the piston in the master cylinder may not be returning to its full "off" position so that the returned fluid can go up through the outlet port and into the master cylinder reservoir.

The first condition, of course, is obvious and the only correction would be to buy a better grade of stop-light switch.



The second condition, that of the check valve, can be easily corrected by installing a new check valve in the brake master cylinder.

The third condition, that of the master cylinder piston not returning to its full "off" position can be corrected by adjusting the amount of free pedal travel by means of the adjusting nut on the front of the master cylinder controlling the length of the piston rod. If this adjustment, which should give approximately 1 inch of brake pedal travel before the master cylinder piston starts to move, does not correct the trouble, it will be necessary for you to overhaul the master cylinder because, very likely, the rubber cups are swollen so that even though the piston does return to its full "off" position the enlarged rubber cups are blocking off the return passage so that the oil remains under pressure instead of being relieved and returned to the master cylinder reservoir.

Oil Leak at Rear Main

I have a customer that is using a Chevrolet 1938 truck for school bus runs about 100 miles a day. This truck has always used oil but now it is worse. It takes about one quart a day. It seems this oil comes from the rear main bearing as it is all wet with oil underneath. The truck now has 8000 miles. We have removed one of the shims at the rear main and this seemed to help for awhile. Can you give me some suggestions?

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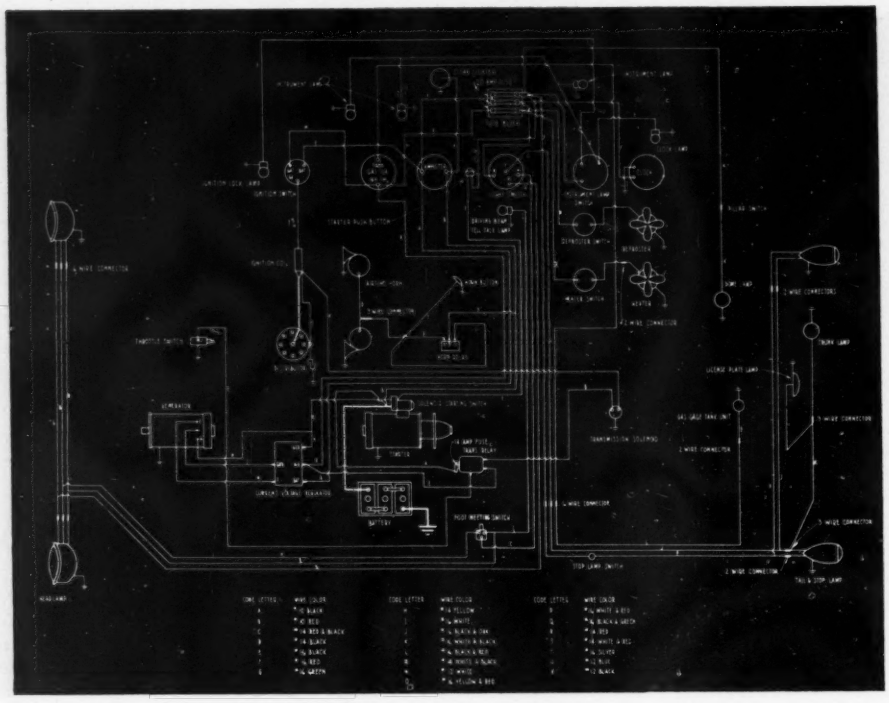


1939 Studebaker President Wiring Diagram

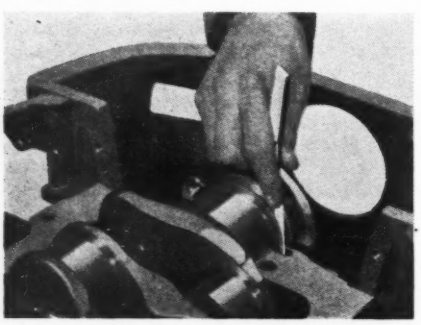
Please advise how to make oil test tank for checking bearings with pan off and advise how to connect up and how to use on various cars.

Please tell me how to check capacity of condensers. Having trouble with points burning up on D-30-35 International truck used for hauling rock. C. B. Norris, Marrowbone Garage, Marrowbone, Ky.

I AM sending you a copy of an article going into details on how to make an oil pressure test tank and also how to make the test on various types of engines.

Now, in regard to the oil leak on the Chevrolet truck, this is generally caused by excessive end-play in the crankshaft which allows the oil slinger on the crankshaft to scrape the sides of the oil trough in the block and rear main bearing cap.

To correct this trouble, remove the oil pan and the rear main bearing cap. Scrape all the carbon from the oil slinger on the crankshaft and out of the oil trough in the bearing cap. Be sure the oil return passage in the bearing cap is clear. Next, slide the crankshaft as far backward as it will go and measure the clearance between the oil slinger on the crankshaft and the rear edge of the oil trough in the crankcase.



Now move the crankshaft as far forward as it will go and measure the clearance between the front side of the crankshaft oil slinger and the edge of the oil trough. If the minimum clearance on either side of the crankshaft oil slinger is found to be less than .002 inch, remove the center main bearing shell and take up the crankshaft end play by adding hard solder to thrust surfaces. The clearance between the crankshaft oil slinger and the edges of the oil trough should be not less than .002 inch nor more than .003 inch.

Now in regards to the condenser trouble you are having on the International, the only way you can check the capacity is by means of special equipment. I therefore suggest that you install a new condenser and, in addition, carefully check your battery connections and your battery ground connections to make sure that they are in good electrical condition. Also, make sure that you do not have excessive side-play in the distribution shaft and bushing.

Jumps Out of Gear

I have been reading Motor Age *for a number of years and have found many useful articles in the Clearing House.*

Now I am in trouble. I overhauled a 1928 Model A transmission that slips out of second gear.

The car is used on the beach sand where it requires a lot of second gear work. The gear shift handle moves back a little at a time until it flys out—it will also fly out on hard road going wide open in second.

I put in a new cluster gear and second speed gear, shifter rail, shifter rail fork, interlocking spring also new gear shift handle. Also, I filed notch deeper in the shifter rail. Everything seems O.K. but it still jumps out of second.

I am now wondering if the trouble is in the transmission or some place else. If you can give me any dope on this problem it will be greatly appreciated. William E. Hall, Bridge St., Bay Head, N. J.

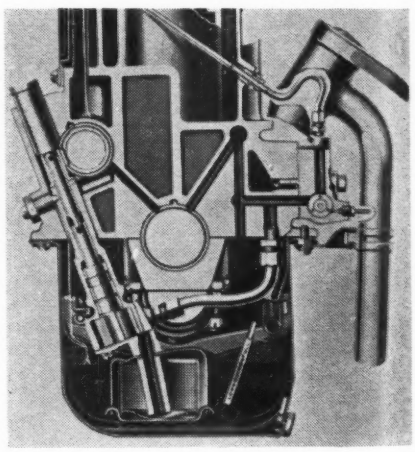
IF all the parts you installed in that 1928 Ford transmission are in good condition, the only thing that I can see which would cause it to continue jumping out of second gear would be that you have a sprung transmission case, or that the spline shaft is excessively worn.

I would suggest that you check particularly the spline shaft and if the installation of a new one does not overcome your trouble, I would recommend the installation of a new transmission case.

Oil Leak

I would like to have information in regards to a 1936 Standard Chevrolet leaking oil out of distributor shaft. Please advise how to repair this. A Pennsylvania Subscriber.

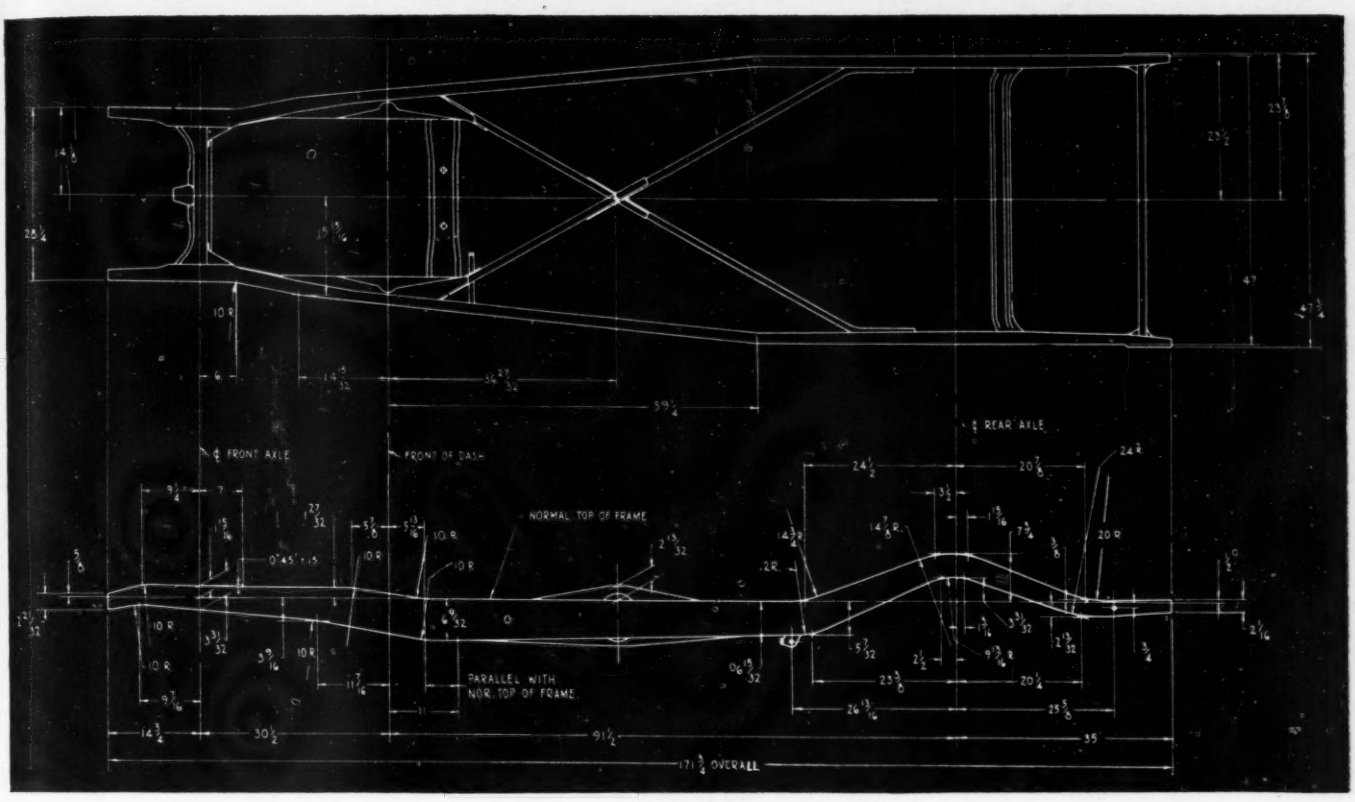
ON the 1936 Chevrolet, the oil is drained from the distributor shaft back into the crankcase by means of a flat ground on the side of the pump housing. If you will remove the lock



screw from the side of the engine block and then drop the oil pump, you will find that one side has been ground flat. Clean any accumulation from this surface and your trouble should be eliminated.

On some of the other Chevrolets, they had a hole drilled below the distributor bearing into the case. In some cases, it is necessary to increase the size of that hole to provide adequate draining.

HELP
---for your repair problems may be had for the asking. Just drop a line to ——
MOTOR AGE
Readers' Clearing House



Frame Dimensions 1939 Studebaker President

Two Strikes

I would like to have some help on a couple of small problems I am having at the present time. One is, I have a 1929 De Soto (the motor is in very good condition for a car this old) which keeps burning out condensers. I have burned out four in about three or four hundred miles. When the first one or two burned out I put in new battery cables, tightened up connections on coil and ammeter, etc., still the same thing happened. The car runs well and hits on all six cylinders and does not jerk on a slow pull.

Problem No. 2 is a 1937 Ford 85 which seems to be hard on resistance units. A short time ago I had to put one on before it ran at all without wiring across. Now it is hard to start unless unit is shorted across then it kicks right off. Then it takes spells when it doesn't seem to burn all the gas just right.

Now of course this could be due to some other fault. Do you think a bad coil would have any effect on the unit? If so, I can have coil tested on a Bear tester. Herman Godbey, R 5, Salem, Mo.

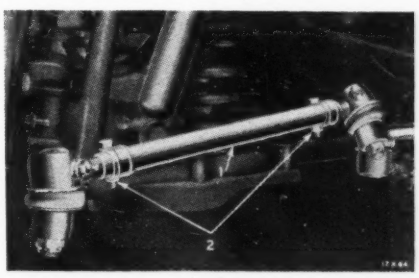
BOTH of these cases are indicative of high voltage and in the case of the De Soto, it might be due to either a bad coil or a high resistance in the circuit which is causing the voltage to build up. I would first test the coil and then check for bad connections—particularly the battery ground strap and the engine ground strap.

In the case of the Ford, I would check the coil and also the generator charging rate. It would be a good plan to put a voltage regulator on that generator to insure proper voltage control. The fact that the car is hard to start unless a jumper wire is used to cut around the resistance unit would seem to indicate a bad coil, and I believe you will find this to be the case.

It would probably be a good idea to put on a rebuilt distributor in which the coil has been thoroughly tested and, at the same time, reduce the generator charging rate.

How Long?

I would like to know if you have the lengths of the tie rods for the 1938 De Soto. Can you give me this information for other cars also? Three Rivers Garage & Machine Shop, 111 Moore St., Three Rivers, Mich.



THE long tie rod should be adjusted to 31⅝ inches between ball stud centers and toe-in adjusted by the short tie rod.

The model C-18 Chrysler also calls for a long tie rod of 31⅝ inches, while the C-19 Chrysler 1938 calls for the tie rod to be adjusted to 30 25/32 inches.

Will It Blow Up?

We hear a lot of people say a gasoline tank will explode if a hot soldering iron is used to solder it with.

We have soldered quite a few tanks without filling them full of water and have never had any trouble. Of course, one time would be one time too many.

Of course, anyone should know to keep an open flame away from a gasoline tank empty or full. And, it wouldn't matter how long it had been empty, it would still be dangerous. Will appreciate a word from you on this. Willard Knox, Lelia Lake Garage, Lelia Lake, Texas.

YOU are 100 per cent right when you say that is safe to solder a gasoline tank with a soldering iron just as long as you don't bring any flame close to the tank. The reason for this is that the ignition temperature of gasoline is in excess of 1300 deg. and as long as your soldering iron is below that temperature—you are perfectly O.K. As a matter of fact, the temperature of the soldering iron is in the neighborhood of less than 500 deg. so you see you have quite a factor of safety.

Won't Take It

I have a 1937 Chevrolet that simply will not take the gas at low speed.

I have tried the usual remedies, new spark plugs, valve job, etc., without results. As soon as the engine is put under a heavy load, a slight roughness or missing is noted and the

(Continued on next page)

ammeter hand jiggles violently. As soon as it picks up some speed everything is all right. What do you suggest? Homer M. Steelve, Snap-up Gas Cap Co., Ashland, Ky.

FROM the description you have given me of the trouble you are experiencing on that 1937 Chevrolet, I would suggest that you make a careful examination of the entire primary ignition circuit—including the battery cables, the ground cable, the engine ground and also make sure that the distributor shaft and bushing are not excessively worn.

If your engine is not equipped with a separate electrical ground, I would suggest running a wire from the distributor housing direct to the frame side rails so as to provide a good electrical ground.

Where Does the Oil Go?

Would like some information on a 1934 Plymouth that uses oil excessively. Have installed new rings, also put in a new oil seal back of rear main bearing.

Cylinders seem to be in good shape as to roundness and taper. Bearings Both connecting rod and mains—are in good shape.

Would like to know what to do to stop oil consumption which is about two quarts per hundred miles.

Can main bearings be removed and new ones installed without removing motor from car? E. W. Werner, Box 442, Warren, Ill.

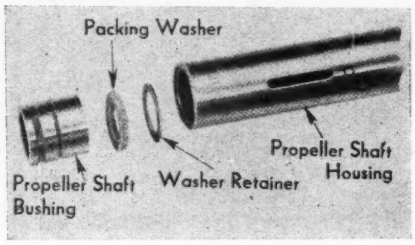
THERE is always the possibility that outside leaks are responsible for a large share of the oil consumption but your letter does not mention whether or not there are any outside leaks. If the engine is burning the oil, it might be due either to poorly seated rings or excessively worn intake valve guides. Your letter does not state that the engine smokes—indicating that it is burning the oil.

If the engine is burning oil and it is due to oil leaking by the intake valve stems, it is possible to install valve guide packing on each valve guide to cut down this consumption. Naturally, the fit of the connecting rod and main bearings has a lot to do with oil consumption and it might be necessary to make a pressure test of the bearings in order to determine the exact condition of the rods and main bearings and also of the camshaft bearings Incidentally, the crankshaft bearings can be renewed without removing the engine from the car or without removing the crankshaft. They are the slip-in type of bearing and can be rolled around the shaft without removing it from the engine. It is necessary, however, to remove the timing chain cover in order to remove a bolt that extends through the front motor support. This bolt interferes with removing the main bearing cap and the bolt has to be removed before the cap will come down.

Grease Leak

I have a 1934 Chevrolet which leaks grease around the ball joint case and drive shaft. I have drilled rear of transmission case and installed new cork grease retainers, but it still leaks.

Could you help me on this problem? W. J. Fly, Auberry Garage, Auberry, California.



I AM quite sure that if you will install a new bushing at the front end of the torque tube on your Chevrolet, that you will be able to overcome your grease leak.

Valve Noise

We have a 1936 Nash Ambassador Twin Ignition "8" with noisy tappets and would like some advice. This car has 12,500 miles on it and has never had the valves ground. The setting for tappets is .015 in., but they are very noisy this way. With tappets set at .010 in. motor runs very quiet for about five minutes then it develops a sharp clicking noise. A little oil can be put on the tappet adjustments and allowed to run down the push rods and the noise will go away but will come back in about five minutes of running.

Sometimes, these noises will come in three or four at one time. We have tried every setting from .010 to .015 in. with no luck. We get rid of the clicking noises then we get noisy tappets or the other way around. This man had this car in a couple of other shops but they could not do anything with it. Any advice you may be able to give us on this problem will be greatly appreciated. Joseph Pisenti, Pisenti Bros., Santa Rosa, Calif.

THE first thing I would do with this job would be to replace the tappet adjusting screws. If this does not correct the trouble, it may be necessary for you to replace the valve lifters. The fact that when oil is allowed to run down the push rods the noise is eliminated leads me to believe that the trouble is in either the valve lifters or in the push rods.

MOTOR AGE INDEX

A Reference List of Articles Which Appeared in Motor Age During 1938

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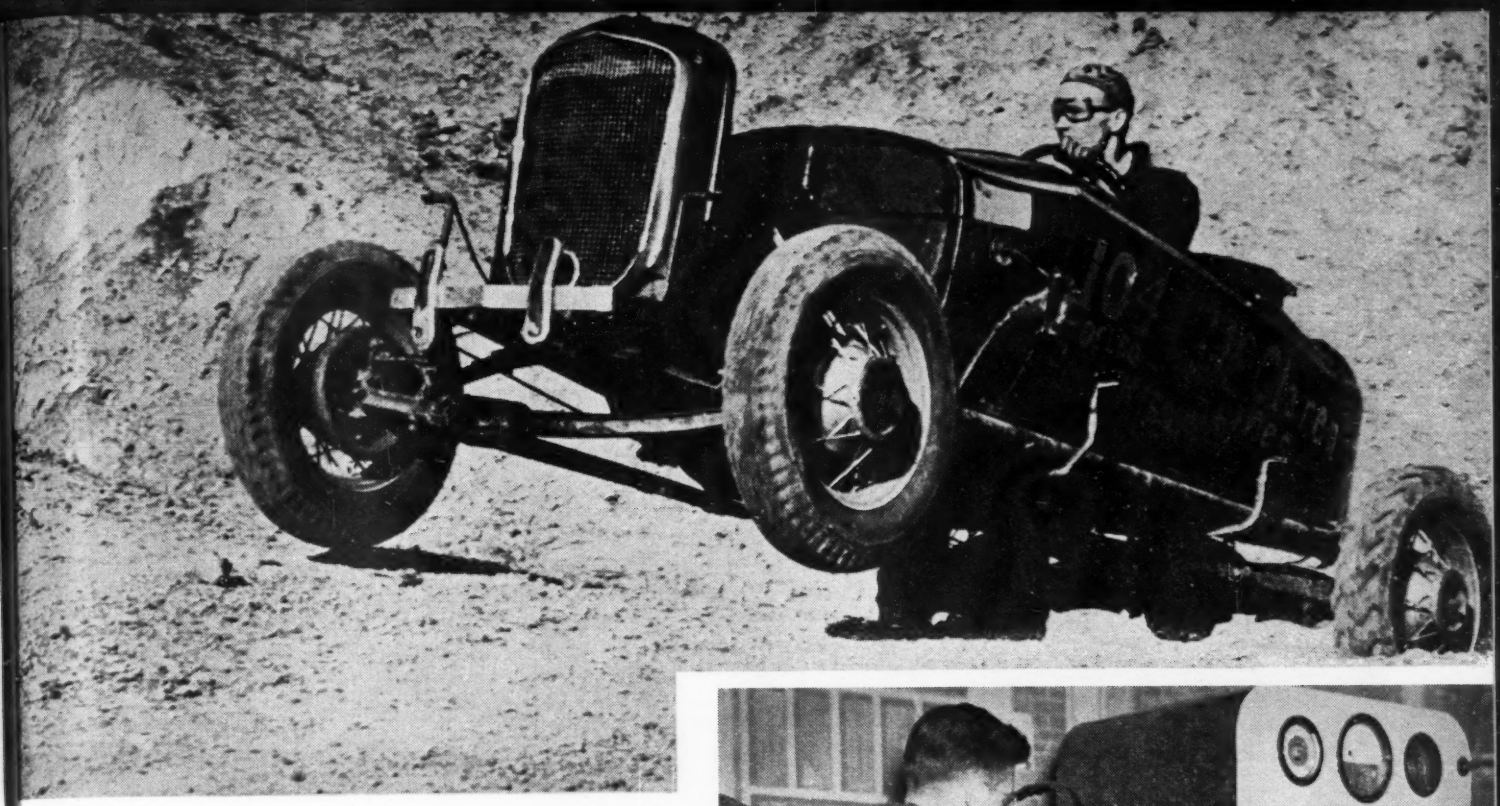
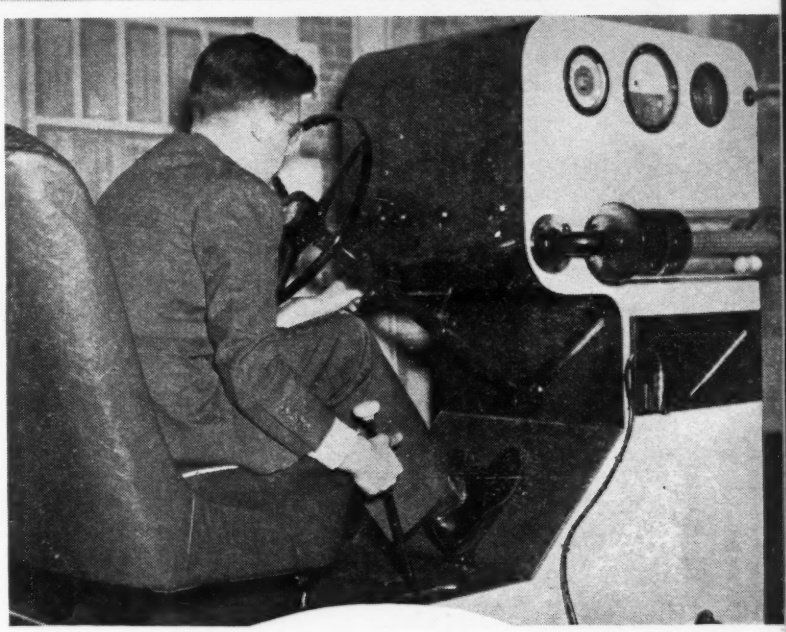
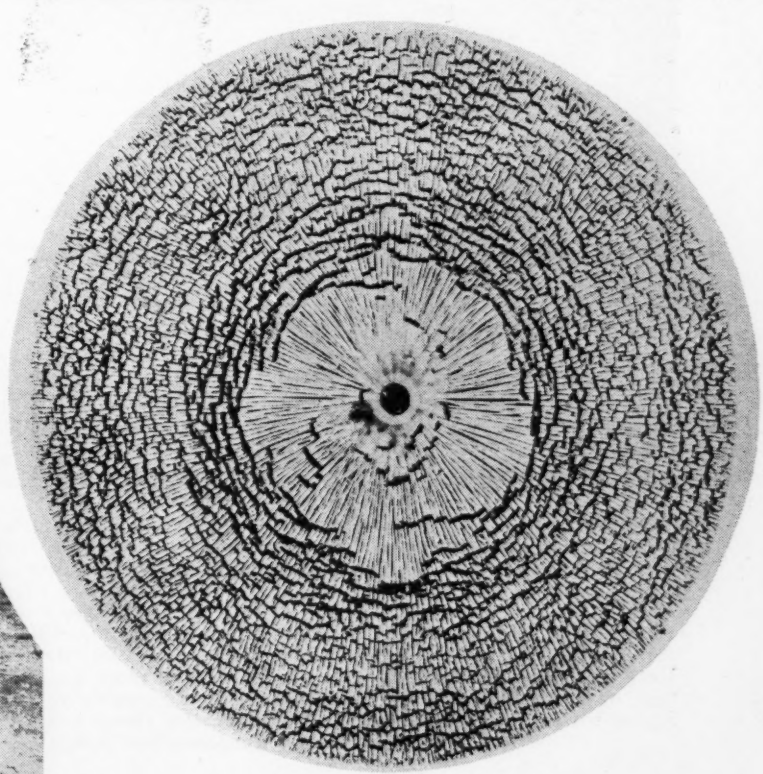




(Top) Jack Stingerie, a farmer near Denver, Colo., was dissatisfied with the prices he was getting for his farm produce. He mounted his tractor and cut a race course through, over and around a series of washouts and gullies on a portion of his farm. He sent out a call for jallopy drivers and is now enjoying a nice income due to the popularity of this sport. Here's one of the sputtering broncos as it cleared the top of one of the hills on this tricky track.

(Right) Walter Powers, Walker Manufacturing Co. engineer, demonstrates an ingenious new piece of laboratory equipment for comparing and analyzing the difference between exhaust sounds, back pressure and features of muffler construction. This device is said to actually measure back pressure and noise in exhaust systems and provide engineering data unobtainable through any other method.

(Circle) List among the things you probably never knew till now that when glass breaks the cracks move at the rate of nearly one mile per second—or more than 3,000 miles per hour. A Cambridge, Mass., scientist made this photo at an exposure of one-millionth of a second. The black spot in the center is the end of a metal plunger that struck the glass, shattering it and causing the cracks that radiate from the center to form a perfect circle, indicating that all cracks move at the same velocity when glass shatters.



(Below) Imagine the surprise the owner of this car received when he returned from a restaurant in New York City to find his auto, which he had parked but an hour before, in this condition. Another car struck a fire hydrant, breaking it at the base. The resultant flood undermined the street, plunging the parked car into this enormous flooded hole.

Faster Speeds Predicted for Indianapolis

Qualifying distance cut from 25 to 10 miles for 1939 Classic

Race car engineers are faced with demand for faster speeds to guarantee a position among the 33 cars which will start in the 500-mile International Sweepstakes on the Indianapolis Speedway next May 30.

Entry blanks for the 1939 classic, mailed last month to top ranking drivers and car owners of the United States and Europe, cuts to ten miles the distance cars must run in qualifying trials. In former years the qualification average has been based on a twenty-five mile run.

Experts immediately went on record that the shorter distance will result in an all-time record speed for qualifications on the two-and-one-half-mile brick oval. The existing mark of 125.77 m.p.h. was established last Decoration day by Ronny Householder at the wheel of a six-cylinder Thorne Sparks Special.

Reliable opinions look to a speedier gait for "at least" two reasons—(1) less strain on the motors because of 15 laps shaved from the qualifying distance, and (2) lesser hazard to the automobile, which has been primed for the annual classic listed several days following the trials.

These same experts also anticipate a new all-time record for the twenty-seventh 500 mile race. For, they say, the speeds necessary to clinch a starting berth will require stronger engines to withstand the punishment of the thundering pace of the preliminaries. The present record for the five-century is 117.20 miles per hour, established last May 30 by Floyd Roberts when he won the classic at the wheel of his four-cylinder Burd Piston Ring special entered by Lou Moore.

Cars must attain 110 m.p.h. to be eligible for the race, but it is doubted if the minimum will worry those getting the 1939 assignments. The date of qualifying trials will be announced prior to May 1, in line with the speedway management's annual custom.

While the new entry blank does not list the number of gallons of lubricating oil allowed, it does place a restriction on the quantity.

Added to the information that "Oil supply for entire engine lubricating system is unlimited," is the limitation that "no further supply may be taken on during the race." In recent years and in the 1938 race, eight gallons was the maximum quantity any car could use. With the cars fully lubricated, the rules will not permit a supply of oil in the pits after the race starts. As stipulated in the former limit of eight gallons, the cars will be required to finish the race on the supply carried or fall prey to mechanical failures.

The only other change in car restrictions pertains to the body which this year will not be allowed to carry open pontoons. The pontoons (streamline covering over the wheels) have been used in varied designs during recent events. The new rule is accepted as a safety measure to eliminate wind currents that might swerve a car under the terrific pace now run at Indianapolis.

The classic will be run for the second year under the new International Formula of Rules decreed by the International Association of Recognized Automobile Clubs, with headquarters in Paris, France, for world-wide uniformity of specifications. The formula, introduced in 1938, will terminate after the 1940 season. The Sporting Commission of the A.I. will meet prior to termination of the existing rules to draw a revised set of requirements for competition of 1941, 1942 and 1943.

Again the prize slip is expected to soar to the $100,000 distributed annually to each of the starting cars. The first ten places will net the entrants an aggregate of $50,000 and the remaining cars will be awarded consolation awards of not less than $500 each. Cars are included in the consolation payoff regardless of whether they complete the 500 mile

Prize winners **One of the features of this year's Automotive Service Industries Show in Chicago was the awards from the Joint Show Operating Committee for the three exhibits that best merchandised their products. The winning exhibits were chosen by ballot cast by jobber members of the N.S.P.A. and M.E.W.A. First prize went to the exhibit of Thompson Products, Inc. (top), which featured in giant size a reproduction of the servicing manual which the company is offering to the trade as a part of its 1939 merchandising program. Kester Solder Co.'s exhibit (center) won second prize for its realistic presentation of a small-town garage work-shop which emphasized the many uses of Kester products. The Perfect Circle Co. exhibit (lower) colorfully decorated in red, black and white took third prize.**

distance, with the first car out of the running being placed last on the finish roster.

Accessory firms are already completing arrangements for their annual contribution to the purse.

The speedway management, regardless of accessory firm awards, will pay the following lead prizes: First place, $20,000; second, $10,000; third, $5,000; fourth, $3,500; fifth, $3,000; sixth, $2,200; seventh, $1,800; eighth, $1,600; ninth, 1,500; tenth, $1,400. The speedway management will also pay the consolation monies.

Although riding mechanics have not ridden the route since the 1937 race, the rules still permit drivers to carry the second man and use two-man cars if preferred. However, the one-man mounts were used in 1938, and present indications are that no mechanics will ride in 1939.

Car dealers and service men showed keen interest in the Nor'way anti-freeze booth at New York's automobile show. The giant working models of the Nor'way direct-reading tester and the Nor'way calculator together with a full size cross-section model of an automobile engine were of particular interest.

Tracing the Missing Credit Customer

A few tips on finding the customer who disappears with bills unpaid

The repair shop operator may be ever so careful as to the investigation of those to whom he extends credit, yet, occasionally he may suddenly be surprised to find that a debtor has left for parts unknown.

The matter of credits is a very important one with farsighted merchants. Some people who have been perfectly honest and good credit risks in the past may be forced, during adverse conditions to do things that, under ordinary circumstances, they would not think of doing. For this reason, every retailer should be prepared for quickly locating "skips."

Sometimes it becomes necessary for the merchant to turn to a detective in order to locate those who have moved without paying their bills. The following plans suggested by a retail credit manager, who has used them all with success, should be borne in mind whenever cases of this sort occur:

1. Interview a number of the neighbors, not just one or two. 2. Send a telegram to the debtor's last known address and note the report made by the telegraph company. 3. Inquire at the nearest doctor's, dentists and drug stores. 4. Try the gas, electric and telephone company for change of address, credit records and references. 5. Find out if the debtor belonged to a lodge or a club. 6. Investigate the state records of automobile owner's and driver's licenses. 7. Endeavor to locate the records of other property owned in the city. 8. Check the chattel mortgages recorded and confer with other creditors. 9. Follow the clues presented by the movements of other members of the family. 10. Inquire at the nearest school regarding the children, if any, and their change of address. 11. Look through the general index of justice court suits and the plaintiffs in any of these. 12. Secure former address from old directory and question those in the vicinity. 13. Interview the local postman and other postal authorities for possible forwarding addresses for mail. 14. Try to find what trucking company moved the furniture and what its record shows. 15. Make investigations at places where the debtor was formerly employed. 16. Inquire of railroads and other freight transportation companies. 17. Check any possible records at police station in the vicinity. 18. Inquire at the church to which the debtor's family belonged. 19. Try the experiment of sending a dummy express package and watch the report made.

EBONBLAK and PYRALUX

In our December issue we printed an announcement of the development of EBONBLAK and Automotive PYRALUX Undercoat by E. I. duPont deNemours & Co., Wilmington, Del. Some errors appeared in that announcement, and in order to correct any misunderstandings that may have resulted, we are pleased to present the following corrected announcement.

Known as 251-2138 EBONBLAK, this new product is a black pyroxylin enamel for touch-up and spot repair work where speed rubbing is necessary. It is claimed to be a quicker and harder drying black which may be rubbed in a short time after application without taking on a gray tone.

Automotive PYRALUX Undercoat, known as 233-1670, is light gray in color and is intended especially for use under Automotive PYRALUX to prevent "sinking in" and to obtain a uniform gloss.

Both of these products are packaged in quarts, gallons and five gallon cans.

Battery Locations on the 1939 Models

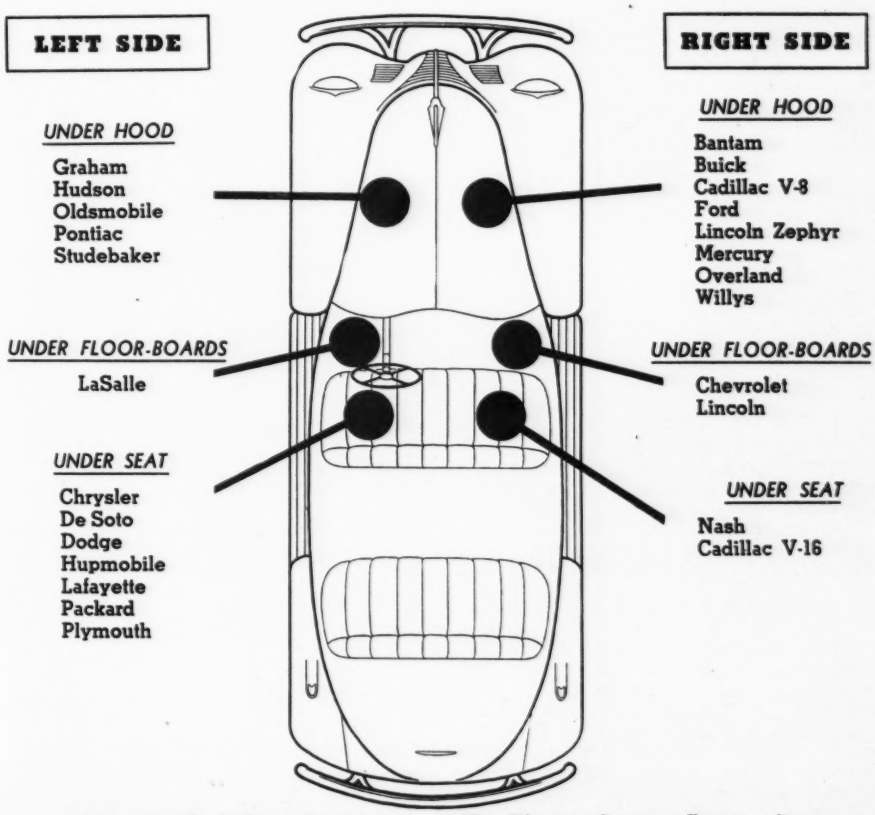
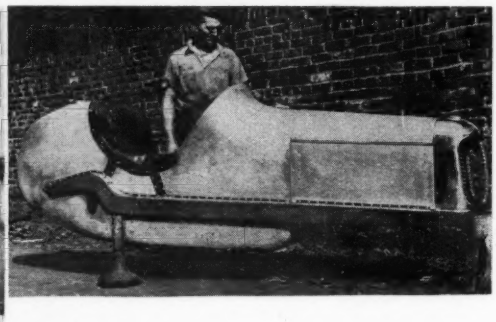


Chart supplied through courtesy of The Electric Storage Battery Co.



Jimmy Wilburn, left, stole the spotlight east of the Rockies for the first time in 1938 to win the championship of the Central States Racing Association. Above is shown the car Ralph Morgan is building for him to wheel around the 1939 circuit. It will be powered with an Offenhauser engine.

Brake Inspections Bring Extra Profits

American Brakeblok division of the American Brake Shoe and Foundry Co. has been urging repairmen using its products to inspect the brake condition of each car entering their shops. Believing that additional income for the repair man could be created in this way, the company supplied record forms for keeping track of the results of the inspections.

The company reports success with the measure and offers as proof the 20-inspection form filled out by one shop. The results of the following 20 inspections, yielding a total immediate business of $125.80, are regarded as a good average by the company:

Mileage	Condition	Work Done	Charge
17489	Worn out	Will be back	None
27559	Worn out	None	None
37108	Worn out	None	None
9683	Worn out	Reline	$14.80
30602	Worn out	None	None
25552	Worn out	Shoe Exchange	$19.50
19456	Good	None	None
36176	Good	None	None
26965	Good	Major Adjust.	$5.50
46697	Worn out	Reline	$14.10
15912	Good	Adjustment	$1.50
21151	Good	Adj. & Master Cyl.	$8.50
25700	Worn out	Will be back	None
21384	Worn out	Reline	$14.40
7400	Worn out	None will trade	None
64245	Worn out	Reline	$14.40
26427	Worn out	Reline	$15.70
17630	Worn out	Reline & Turn Drums	$17.40
30899	Worn out	Going to trade	None
22119	Worn out	Will be back	None
34141	Good	None	None
		Total	$125.80

Forms with spaces for recording 20 inspections will be sent to repairmen writing to the company and requesting them.

Announce Premiums with Ring Purchases

Shop equipment such as electric tachometers, exhaust gas analyzers, bearing oil-leak detectors, tension wrenches and many other tools and accessories are now available free to repair shops with the purchase of Pedrick piston rings, Wilco valve packing and Wilco piston expanders.

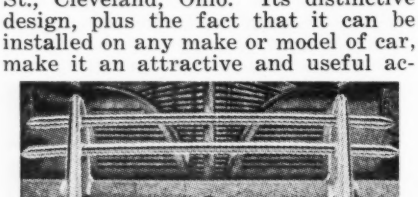
Each box of Pedrick piston rings, Wilco valve packing and Wilco piston expanders will contain a premium coupon having a value corresponding to the value of the box contents. By saving these coupons with the box tops they may be exchanged for any of the premiums listed and illustrated in the Pedrick-Wilco Premium Book.

The Pedrick-Wilco Premium Book is free to repairmen and can be obtained from the Pedrick jobber or by writing direct to Wilkening Manufacturing Co., Philadelphia, Pa., or Toronto, Ontario, Canada.

According to the manufacturer, many of the Pedrick-Wilco premiums can be obtained for a very few coupons so that repairmen can get almost immediately some of the tools and equipment they have long wanted and needed.

Ward Introduces New Grille Guard

A new "Super DeLuxe" Grille Guard has been introduced by The Ward Products Corp., 1523 E. 45th St., Cleveland, Ohio. Its distinctive design, plus the fact that it can be installed on any make or model of car, make it an attractive and useful accessory. The vertical posts are 16 in. high, and the curved bars are ¼ in. dia. x 25 in. long, giving a full sweep of protection to radiator grilles. For detailed information and prices, write the manufacturer.



G. Roy Tierney, well known in the automotive field as regional sales manager, automotive merchandising department of Johns - Manville Sales Corp., has been elected president of the San Francisco Boosters' Club, B10.

C.S.R.A. Payoff Up in 1938

Drivers earned $34.80 for each winning mile in races sanctioned by the Central States Racing Association during 1938, it was revealed in the year's summary which reported increased activity for the sanctioning body. The mileage payoff was $3.56 per mile more than the earnings in 1937, the report shows.

In 29 races sanctioned during the year, the CSRA supervised payment of $34,835 in prizes. In 1937 there were 24 races run under the group's sanction.

Total of 1100 miles of racing in 1938 compared with 954 miles in 1937 was responsible for the richer payoff. Prizes in 1937 totaled $29,816, which was $5,019 less than the 1938 prize slip.

Norman Witte, secretary of the association, said the figures includes dates to November 27 and did not show prizes paid in the southern circuit in recent weeks.

The southern schedule which reached its half-way mark at Savannah, Georgia, on December 18, will be resumed in mid-January. The balance of the schedule will include events at Savannah and in Florida cities.

Williams Adds New "Supersocket" Line

J. H. Williams & Co., Buffalo, New York, has announced the addition of new extra deep Bantam "Supersockets" with 12-point and 8-point openings, and Universal 12-point, all with ⅜ in. square drive. These sockets have thin, straight walls and are said to be particularly adaptable for use on body, fender and running board bolts and on buried nuts.

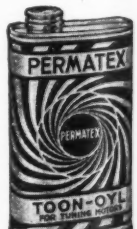
The Universal sockets are very

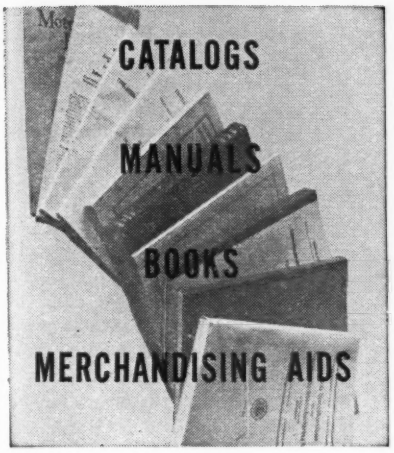
short and compact for use in the closest of close places. They operate through a range of 180 deg., and are fitted with spring tension to maintain the desired angle when applying the socket to the job.

Detailed information and prices may be obtained from the manufacturer.

Toon-Oyl

The latest product of the Permatex Co., Inc., Sheepshead Bay, N. Y., is known as Toon-Oyl. Added to the crankcase oil it is claimed to dissolve carbon-gum formations that cause valves and piston rings to stick. The manufacturer states that Toon-Oyl is harmless to cadmium-silver and copper-lead bearings.





Hygrade Products Co., 516 W. 34th St., New York City, announces a new type of carburetor parts catalog. This catalog consists of 148 pages, introducing a new feature, TEL-O-VISION car guides, whereby a counterman or mechanic is enabled to definitely ascertain and locate a desired carburetor part in the wink of an eye. As you locate the part, you immediately see what it looks like by its illustration on the same page. The

range of parts for each popular carburetor has been widely expanded and brought right up to date.

The new set-up has been built along merchandising lines through the incorporation of low-priced assortments for the repair shop, tools and testing equipment. The outstanding feature is the range of about 160 individual CONTAIN-ALL-KITS, similar in scope and purpose to Hygrade's Contain-All kits for fuel pumps.

L. C. Chase and Co., selling division of Goodall Sanford Industries, makers of automobile upholstery, have recently published reprints of their popular booklet "On the Spot" which deals with methods of removing stains from the various types of car upholstering fabrics. The Chase company's office is at 295 Fifth Ave. at 31st St., New York City.

Allen Electric & Equipment Co. has prepared a "home study" study course in modern engine tune-up. The course is comprised of twelve lessons, each with a comprehensive examination covering its subject matter.

National Motor Bearing Co., 1239 78th Ave., Oakland, Calif., has introduced its 1939 grease seal merchan-

(*Continued on page 63*)

U. S. Rubber Promotes Sheahan

Emmet Sheahan, of Detroit, received another promotion in the United States Rubber Co. organization, it was announced today by F. B. Davis, Jr., president and chairman of the board of that company.

Effective Jan. 1, Mr. Sheahan, in addition to his duties as operations manager of U. S. Rubber's Detroit and Indianapolis plants, became general manager of the new automotive division of the rubber company. The operations of this new division, with headquarters at Detroit, will include all the many products developed and sold by U. S. Rubber Company in its various factories for use of automobile makers in the manufacture of cars.

Triplewear Brake Lining

Triplewear Brake Linings Corp., Paterson, N. J., has called attention to special features of its "Silver Rib" woven brake lining and the new heavy duty molded brake block.

"Silver Rib" is made from selected long-fiber asbestos yarn, reinforced with zinc alloy and bronze wires which produce the "Silver Rib" effect. These reinforcing wires are said to give protection against brake drum scoring.

Heavy duty molded brake block is also made of long-fiber asbestos. Maximum density is secured by hydraulic pressure. Combined with the material during manufacture are thousands of minute particles of a special metal alloy which appear as tiny flecks of silver on the surface. This special alloy is said to impart a lubricating effect that eliminates grabbing and erratic performance.

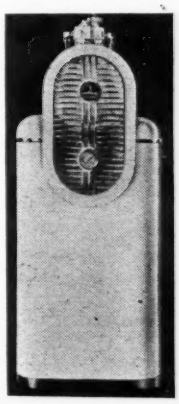
Ethyl Corp. to Present Radio Show Series

With a talent list that includes some of the outstanding names in radio, the Ethyl Gasoline Corp. will go on the air Jan. 12, sponsoring a 45-minute show designed to support the automotive and petroleum industries by giving car owners the basic facts about better gasoline, motor tune-up and car performance.

The show, called "Tune-Up Time," will feature Walter O'Keefe, nationally famous comedian, as master of ceremonies. Andre Kostelanetz will direct his 45-piece orchestra. Kay Thompson, originator of a new style of vocal swing and veteran of many big-time radio shows, will also be heard with her 12 rhythm singers. In addition, there will be a nationally-prominent guest star each week. "Tune-Up Time" will be broadcast over a coast-to-coast network of 63 Columbia Broadcasting System stations every Thursday night at 10 o'clock, EST (9 p. m., CST; 8 p. m., MST; 7 p. m., PST).

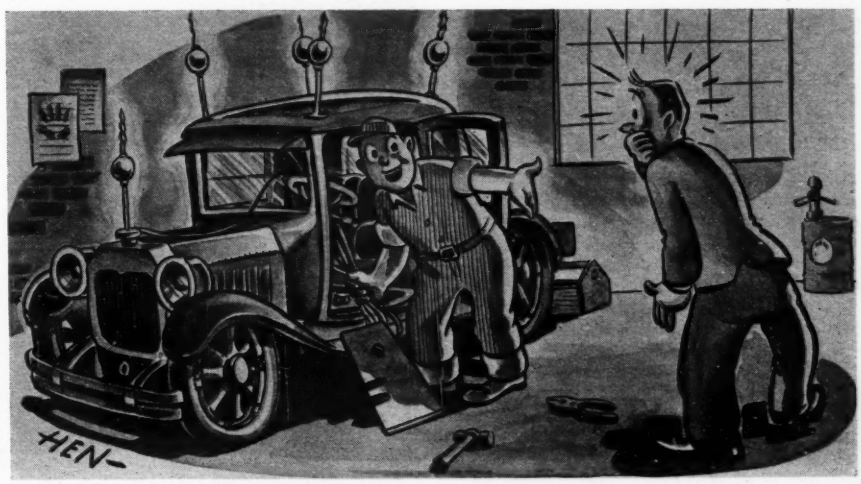
According to Paul E. McElroy, Ethyl Gasoline Corp. advertising manager, leaded gasoline will be promoted on the air in such a way that the automotive and petroleum industries will benefit. The purpose, Mr. McElroy says, will be two-fold. First it will emphasize the importance of better gasoline by pointing out that no automobile can deliver a grade of performance better than the grade of gasoline in the tank. Secondly, motorists will be advised to go to their automotive service men at regular intervals for complete motor adjustment, including spark advance for the grade of gasoline used.

Air Compressor for Automotive Use



The Quincy Compressor Co., Quincy, Ill., has announced a new streamline air compressor especially designed for automotive service work. The unit it attractively finished in a durable, soft green, art metal finish. Grilles, trim and intercooler are a natural copper color. It occupies a floor space only 25½ in. x 25½ in. The tank is located in the bottom of the cabinet, with the motor-compressor assembly directly above, and mounted on rubber. Power connection is by means of a two-groove v-belt drive.

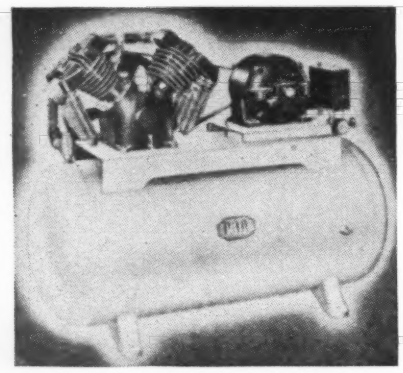
Sizes range from 1 to 3 h.p., with piston displacement from 5 to 13 cu. ft. per minute. For complete information, write the manufacturer.



"It's McTavish, Boss. . . . Says if lightning should strike, it might as well charge the battery!"

PAR Announces New Models

The Modern Equipment Corp., Defiance, Ohio, has announced a completely restyled line of PAR air compressors for 1939, and has added four new models to the line. Seventeen sizes are available in twenty eight models of horizontal and vertical assemblies.



Changes include new and larger sizes of tanks using balloon heads, a new motor mounting, pumping units increased in size to afford larger displacement at lower operating speeds, higher volumetric efficiency through increased valve sizes, larger intake mufflers and a redesigned check valve plunger. Write the manufacturer for detailed information and prices.

Olson Appointed as Hollingshead Sales Mgr.

Lawrence M. Olson has been appointed national sales manager of the R. M. Hollingshead Corp., Camden, N. J., makers of Whiz automotive chemicals and lubricants. Mr. Olson joined the Hollingshead Corporation in 1923, and has successively held the positions of sales correspondent, office manager, credit manager, salesman, branch manager and regional sales manager of the Midwest Division with headquarters in St. Paul.

Speed Stars Shine on Screen

At least a half dozen Indianapolis speedway kingpins turned actor in recent weeks to appear in an auto racing picture produced in Palos Verdes, Calif., a short distance from the Hollywood studios.

Crashing through straw bales and otherwise handling the stunt assignments were: Joe Thorne, the millionaire owner-driver, Rex Mays, Ted Horn, Art Sparks, Louie Tomei, Kelly Petillo, Bob Swanson, Lou Meyer and Fred Frame. You might be interested in seeing the picture when it opens in your home town. The name is "Skids" and it is produced by Metro-Goldwyn-Mayer.

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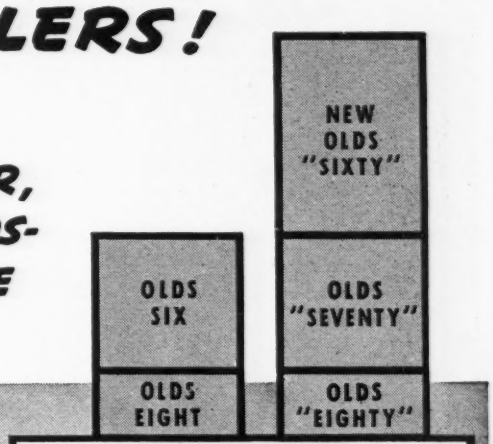
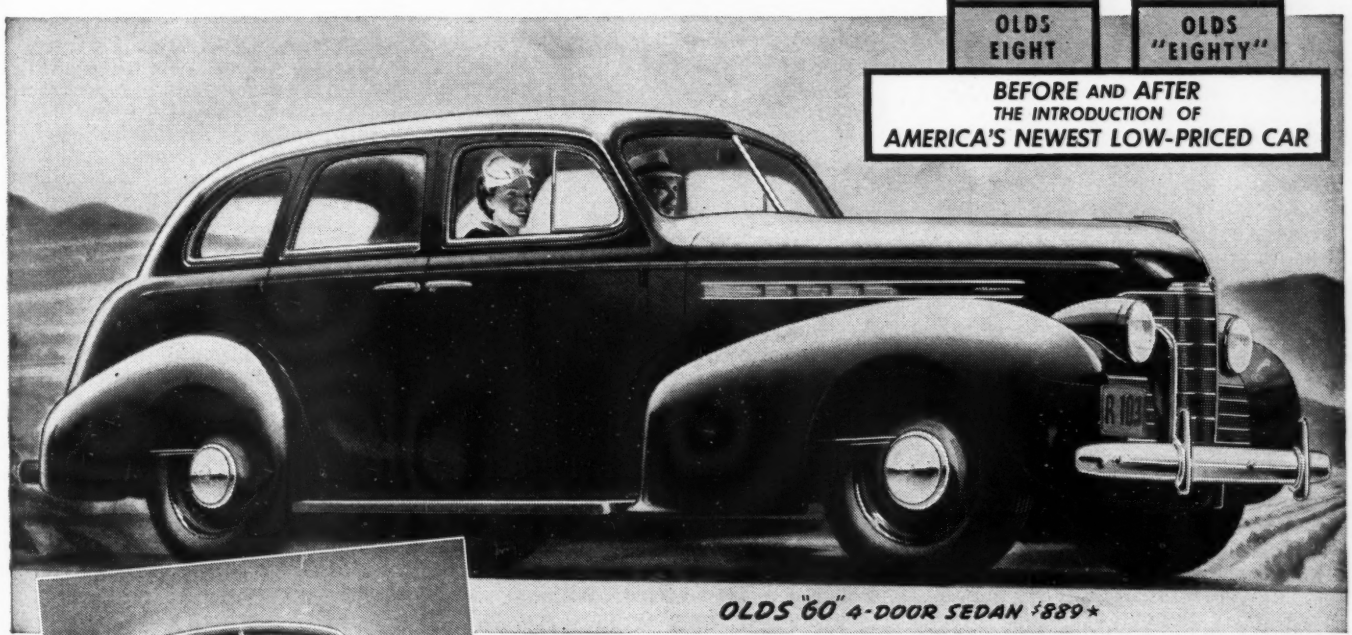
OLDS DOUBLES SALES POTENTIAL FOR OLDSMOBILE DEALERS!

BY INTRODUCING A NEW THIRD CAR, IN A NEW LOWER PRICE FIELD, OLDSMOBILE OPENS UP A MARKET TWICE THE SIZE OF LAST YEAR'S!



BEFORE AND AFTER THE INTRODUCTION OF AMERICA'S NEWEST LOW-PRICED CAR



OLDS "60" 4-DOOR SEDAN $889★

OLDS "70" 4-DOOR SEDAN $952★

OLDS "80" 4-DOOR SEDAN $1043★

FOR 1939, Oldsmobile gives its dealers—*at reduced prices*—stunning new editions of the famous Six and Eight which have been so successful in the past. This fact alone promises increased sales. But that's only *half* the story! Oldsmobile has also introduced a brand new "Sixty" Series in the *low-price field*—where the volume lies. That means *twice* the sales potential—*twice* the chance for profits.

$777 AND UP

★ *Delivered price at Lansing, Michigan, subject to change without notice. Price includes safety glass, bumpers, bumper guards, spare tire and tube. Transportation, state and local taxes, if any, optional equipment and accessories—extra. General Motors Instalment Plan.*

» A GENERAL MOTORS VALUE «

THIS YEAR IT'S OLDSMOBILE!

THE RED HOT LINE FOR '39

"I'll have to take a look at your fan belt."

Speed Union Seeks Prize Money Boost

Race Drivers Organization Responsible for Cut in Qualifying Distance

Increased prizes in top-ranking race events is the goal of a union organized by the speed fraternity at Indianapolis. Thirty-nine of the nation's leading drivers and race car owners have joined the group, known as "Racing Association Affiliated," and have named Ira Vail as their business manager.

Vail said the first achievement of the organization was to bring a cut in the number of miles a car must travel to qualify for the Memorial Day International 500 Mile Sweepstakes at Indianapolis. Vail said it was at the group's request that the AAA Contest Board and the speedway management reduced the qualifying distance from twenty-five miles to ten miles for the 1939 event.

The group has set a definite move to bring about higher prize purses for programs run on the mile tracks of the nation's larger fairs, Vail said.

The driver union, which is similar to the Champion Drivers, Inc., which was in existence in 1935, will insist that prizes be in proportion to the box office receipts, Vail said.

Vail reported that the group has the endorsement of the American Automobile Association's Contest Board and that all members will continue to race under events sanctioned by the AAA.

The drivers elected William S. "Bill" White, veteran championship car owner and race operator, as president. The board of directors includes Roscoe Dunning, race car engineer of the old school; "Cotton" Henning, another veteran mechanic, and Floyd Davis and Russ Snowberger, championship drivers. The membership roster lists:

Bill Cummings, Indianapolis winner in 1934 and national champion that year; Wilbur Shaw, 1937 champion; Rex Mays, Jimmy Snyder, Kelly Petillo, 1935 Indianapolis winner and national champion; Babe Stapp, George Connors, Ted Horn, Tony Willman, Frank Brisko, Emil Andres, Duke Nalon, Charles Crawford, Harry McQuinn, Mauri Rose, 1936 Indianapolis winner and national champion; Shorty Cantlon, Billy DeVore, Lou Webb, Lou Moore, retired driver and owner of the car which Floyd Roberts drove to victory at Indianapolis in 1938; Milt Marion, Frank Wearne, Ken Fowler, George Bailey, Jack Moon, Henry Guerand, Frank Bailey, Bill Schindler, Louis Tomei, Al Miller, Chat Miller, John Moretti, Bill Holland, Buster Warke, George Robson.

Mack Announces "Thermodyne" Engine

Recently announced by Mack is the first of a new series of engines—the Thermodyne. Named the Thermodyne to reflect the thermodynamic advances achieved in its combustion system, this engine is of an entirely new design which has been in the process of development at the Mack factories for several years, the result being high power and torque per cubic inch with high output sustained over a wide range of speed.

This series of engines still has the conventional four-stroke cycle and the established carburetor and spark ignition principle. All these engines have the same six-cylinder layout to which Mack has adhered for many years. Horsepowers for the complete series will range from 145 to 180. A novel feature is the arrangement of the combustion chamber, valve and porting whereby the maximum turbulence is combined with extremely even rate of combustion and smooth pressure rise together with high volumetric efficiency, most favorable spark plug position and clean combustion and scavenging.

Cylinder block and crankcase casting as well as the cylinder head are made of a special high-nickel-chromium semi-steel alloyed in the Mack foundry, and they are heat-treated in order to completely remove shrinkage and machining stresses. The cylinder heads in which the valve and streamlined valve passages are contained are cast in two blocks of three each, each head being retained by twenty holddown studs or forty for the complete engine.

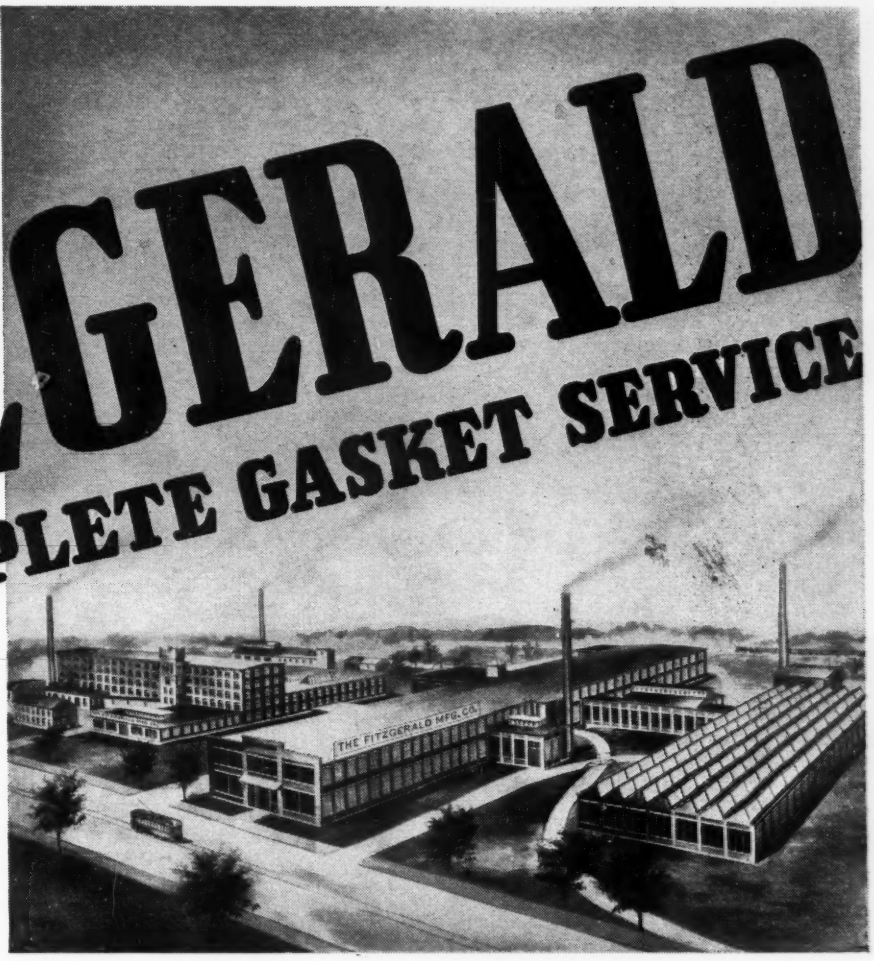
By boring them out hollow, the crankpins have been made large-sized without excessive centrifugal reaction, while passing the connecting rods through the cylinder with such large lower bearings has been accomplished by making a split of the cap at 35 deg. instead of the usual 90 deg. and by retaining the caps by a combination of a mortise and a tenon joint and precision cap screws. To minimize side thrust the rods are unusually long as are the cam-ground T-slot, aluminum alloy pistons, the latter carrying five rings each and provided with an exceptionally thick deck in order to carry off the heat rapidly.

The special and original combustion chamber form which has been developed is responsible for much of the output, responsiveness, flexibility and economy of these engines. With reference to the bores, these combustion chambers are considerably offset so that a large part of the bore is covered by the perfectly flat deck of the cylinder head with a minimum clearance above the top of the pistons, and the bulk of the combustion chamber volume in the form of a D-shaped domed cavity at one side and above the bore. Both valves open into this cavity and the spark plug is located at a focal point so that the flame propagation is both rapid and even throughout the volume.

With the exception of the line to the oil gage on the instrument board, all oil piping whether external or internal has been entirely eliminated from this engine, a great example of the high state of mechanical refinement built into this engine.

FITZGERALD

THE COMPLETE GASKET SERVICE



GASKETS FOR PASSENGER CARS, TRUCKS, BUSES, TRACTORS—FOR EVERY TYPE OF INSTALLATION

Gaskets of highest quality—made from finest materials—of all approved types of construction. Gaskets for every need, including the famous Fitzgerald Bulldog Gasket—a tougher gasket for a tough job — best for heavy duty service and high compression motors.

Tie up with Fitzgerald, not only for better gaskets, but also for sales and merchandising helps—including display material, racks, cabinets and board assortments. Your jobber will give you 100 per cent cooperation . . . The Fitzgerald Manufacturing Company, Torrington, Conn. — Branches, Chicago and Los Angeles — New York Office—Canadian Fitzgerald, Limited, Toronto.

FITZGERALD GASKETS

THE COMPLETE LINE THAT COMPLETELY SATISFIES

The Law Says

(*Continued from page* 20)

fornia Act provides that "it shall be unlawful for any person to sell any article at less than the cost thereof to such vendor or to give, or offer to give, any article or product or service or output of a service trade for the purpose of injuring competitors and destroying competition." Thus, concluded the California Supreme Court, the loss leader statute of that State does not prohibit loss leader selling as such, but loss leader selling for the purpose of injuring competitors and destroying competition. It is the social and economic object of the law which, in the opinion of the California Supreme Court, renders loss leader legislation valid and constitutional.

Conceivably, even under the California Act an automotive man might engage in loss leader selling that is entirely legal. For example, he might sell at a loss in order to meet the legal prices of a competitor. That would be loss leader selling for the purpose of meeting competition and not destroying it.

That these varying court decisions serve to throw the whole loss leader situation into confusion is obvious. On the one hand the court sustains the constitutional right of an individual to sell his own goods at whatever price he pleases; on the other, is the decision holding that this right of the individual must yield to a law designed to serve the general welfare by prohibiting a destructive economic practice. There's no doubt that, sooner or later, the United States Supreme Court will be asked to determine the constitutionality of loss leader legislation since it involves individual property rights guaranteed to every citizen by the Fifth and Fourteenth amendments to the Constitution of the United States. If loss leader laws violate the Constitution of the United States, then no state can enforce them. If a law against loss leader selling does not violate the Federal Constitution, particularly if prohibited in the interest of the general welfare, then every state is free to enact and enforce loss leader legislation.

Out of all this legal welter, these practical guides for the automotive dealer trying to obey the law emerge:

1. Automotive dealers and repairmen located in States having resale price maintenance laws must follow the retail price requirements of manufacturers of trade-marked products. Those laws have been favorably passed upon by the Supreme Court of the United States.

2. The latest California Court decision upholds the law forbidding loss leader selling for the purpose of destroying competition and injuring competitors. One section of the California Act says that selling below cost shall be "presumptive evidence" of an intent to injure competitors and destroy competition. In law such a "presumption" may be rebutted; that is, an automotive dealer would be within his rights to sell below cost if he could show that actually he did not do it with the intent to injure competitors. California automotive men confronted with the problem of loss leader selling should consult their attorneys for advice on the exact status of loss leader selling under the latest California decision.

3. Automotive dealers in other states with laws against loss leader selling should obey those laws unless and until they are repealed or overruled.

Most significant of all the inferences from this whole tangled legal situation is the possibility that if loss leader legislation is found to be contrary to the Constitution of the United States, automotive loss leader selling will be back to stay, and there will then be no way of stopping it short of an amendment to the Constitution of the United States.

Celebrate WITH BURD IN 1939

25 Years of Piston Ring Progress

The Burd "High Compression coupler type" ring of 1914 was the first practical piston ring to solve the problem in motors of that day.

In 25 years motor speeds, compression, piston materials and clearance, ring widths, fuels and oils have been revolutionized. Now, Burd celebrates its silver anniverary by bringing you the most positive, most dependable means for oil control in modern motors—the Burd "Super Hi-Speed" oil ring, with advanced refinements for 1939.

Piston ring requirements for improved motor performance have changed much since 1914, but there is one thing that has never changed—the Burd ideal of precision. Advancement in all factors affecting piston ring performance continues to be the dominant thought in the minds of Burd Piston Ring engineers. Precision, plus a steadfast policy of cooperation with the motor service industry, is the reason why after twenty-five years of uninterrupted service Burd is recognized as the outstanding manufacturer of quality piston rings. We invite you to join the celebration of this, our Silver Anniversary, and build with Burd a happier, more prosperous New Year. Write for 1939 proposition.

BURD PISTON RING COMPANY, Rockford, Illinois
(Associate Co., Liberty Foundries Co.)

BURD Super Hi-Speed PISTON RINGS

LINDBLOOM VALVE PACKING • HADEES HOT WATER CAR HEATERS

ATLANTA, GA. . . 542-544 Spring St. N.W.
BOSTON, MASS. . . . . 1 Brighton Ave.
CHICAGO, ILL. . . . . 2236 S. Wabash Ave.
DALLAS, TEXAS . . . . .. 2705 Canton St.
KANSAS CITY, MO. . . . 1606 McGee St.
LOS ANGELES, CAL. . . . . 1425 S. Flower St.
MINNEAPOLIS, MINN . . . . . 21 S. 13th St.
NEW YORK, N. Y. . . . . 549 W. 52nd St.
ST. LOUIS, MO. . . . . 3225 Locust Blvd.
SAN FRANCISCO, CAL., 540 McAllister St.
SEATTLE, WASH. . . . 1609 Boylston Ave.
TORONTO, 5, Ont. Can. . . . 20 Hayter St.
WINNIPEG, MAN. CAN. . 126 Lombard St.

GET PROMPT SERVICE FROM ANY OF THESE CONVENIENT BURD WAREHOUSES

Saginaw Ball-Nut Steering Gear

(*Continued from page* 19)

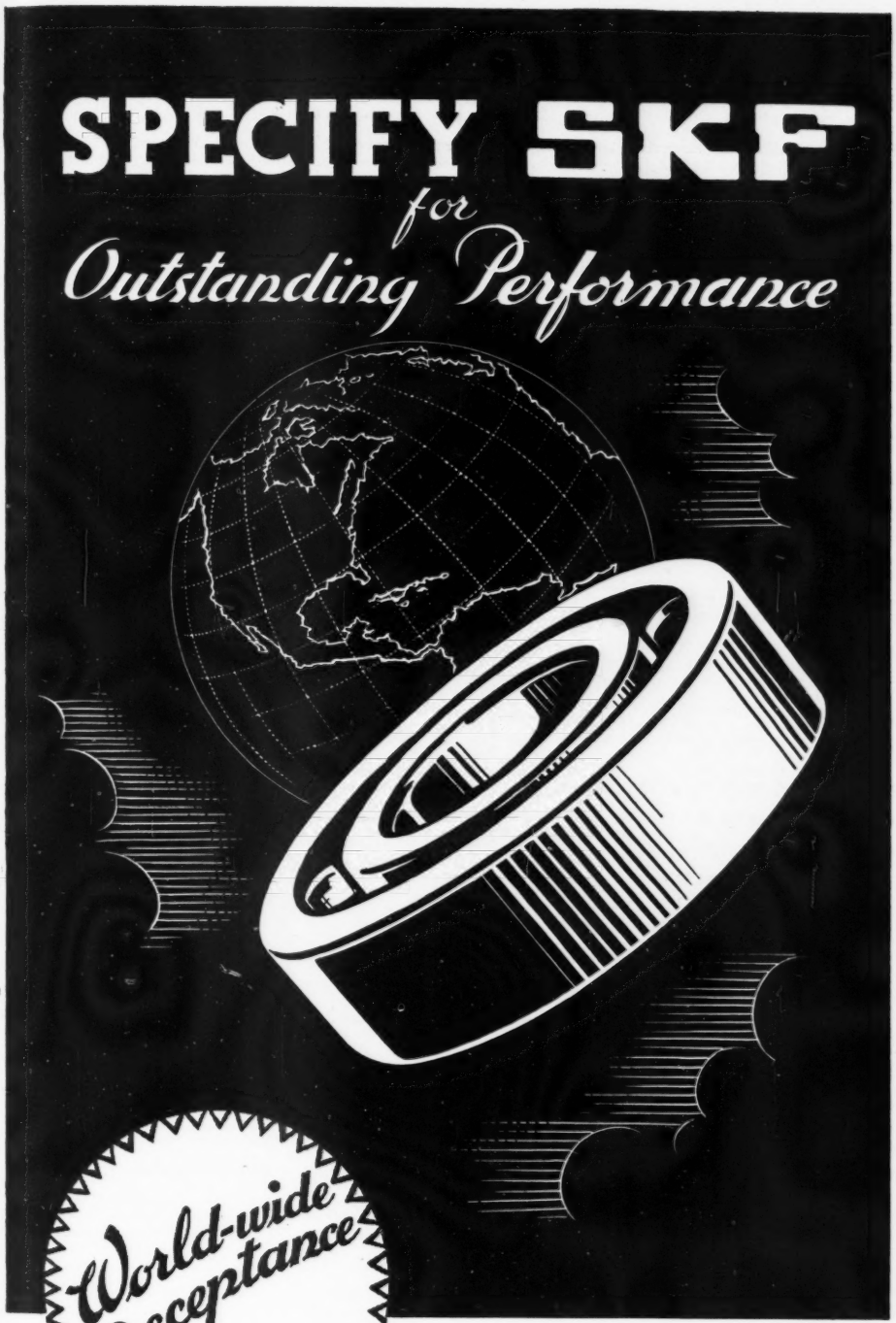
is an important problem in steering gear design, and the manufacturer believes that the "ball-nut gear" represents a worth-while improvement in this respect.

The fit between the worm and nut obviously must be close enough so that there will be no backlash between these parts, and grinding methods have been developed which permit of such a degree of accuracy as to make these parts interchangeable.

SPECIFY SKF

for

Outstanding Performance



World-wide Acceptance

When you hear SKF Bearings mentioned, you probably connect them with super-luxury air liners, transcontinental buses, high speed streamlined railway trains, and thousands of other applications on which SKF's are preferred at vital points.

BUT DON'T FORGET that SKF also plays a leading part in maintaining a real bearing service to the automotive trade.

SKF supplies all SAE standard annular ball bearings and many special types and sizes used in various automotive applications. Your equipment deserves SKF Bearings.

SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

4251

SKF

BALL & ROLLER BEARINGS

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE															CHASSIS						
					No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Bantam.....60	497½	75¼	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	5.22	23.0	CI	Own	Als	No	No	Til	Buf	AL	USL	P.Ro	WG	m-UP	½ Spi	5.25	Tr
2	Buick.....39-40	996	120	6.50/16	8-3 3/8x4½	30.6	248.0	107-3400	6.10	39.4	CI	LB	Al	No	AC	Car	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	4.44	IC
3	Buick.....39-60	1246	126	7.00/15	8-3 1/16x4 5/16	37.8	320.2	141-3600	6.25	41.9	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	3.90	IC
4	Buick.....39-80	1543	133	7.00/16	8-3 1/16x4 5/16	37.8	320.2	141-3600	6.25	39.2	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.18	IC
5	Buick.....39-90	2074	140	7.50/16	8-3 1/16x4 5/16	37.8	320.2	141-3600	6.25	38.0	CI	LB	Al	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.55	IC
6	Cadillac V8-39-61-60S	1680	126-127	7.00/16	8-3½x4½	39.2	346.0	135-3400	6.25	44.2	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
7	Cadillac....V8-39-75	2995	141	7.50/16	8-3½x4½	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.58	IC
8	Cadillac-V-16...39-90	5140	141	7.50/16	16-3¼x3¼	67.6	431.0	185-3600	6.75	43.8	CI	Mor	Ala	AC	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.31	IC
9	Chevrolet..Master 85	689	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	35.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	3.73	C
10	Chevrolet..Mas. DeL.	720	112¼	6.00/16	6-3½x3¾	29.4	216.5	85-3200	6.25	39.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	4.22	IC
11	Chrysler...Roy. C-22	1010	119	6.25/16	6-3 5/8x4½	27.3	241.5	100-3600	6.50	38.1	CI°	Mor	Ala	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
12	Chrysler...Imp. C-23	1198	125	7.00/16	8-3¼x4 7/8	33.8	323.5	130-3400	6.80	42.3	CI°	Whit	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	3.91	IC
13	Chrysler.Cus.Im.C-24	.....	144	7.50/16	8-3¼x4 7/8	33.8	323.5	132-3400	6.80	....	Al	Whit	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	½ Own	4.90	IC
14	De Soto De L.&C. S-6	970	119	6.00/16	6-3 5/8x4¼	27.3	228.1	93-3600	6.50	37.4	CI°	Mor	Ala	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
15	Dodge Spec.&DeL.Six	855	117	6.00/16	6-3¼x4 3/8	25.3	217.8	87-3600	6.50	37.8	CI	Mor	Als	Pur	AC	Str	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
16	Ford.....V8-60	665‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-3500	6.60	....	Al	Dia	CS	No	Yes	Str	Own	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
17	Ford.....V8-85	705‡	112	6.00/16	8-3 1/16x3¾	30.0	221.0	85-3800	6.15	....	CI	Dia	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr
18	GrahamSpec.&Cus.96	965	120	6.00/16	6-3¼x4 3/8	25.3	217.8	90-3600	6.50	....	CI	LB	Als	No	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
19	GrahamSc.&Cus.Sc97	.....	120	6.25/16	6-3¼x4 3/8	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
20	Hudson 112....90-98	806	112	6.00/16	6-3x4 1/8	21.6	175.0	86-4000	6.50	32.4	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
21	Hudson-Six.....92	898	118	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	36.3	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
22	Hudson-C.C.Six...93	995	122	6.25/16	6-3x5	21.6	212.0	101-4000	6.25	35.4	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
23	Hudson-C.C.8...95-97	1079	122, 129	6.50/16	8-3x4½	28.8	254.5	122-4200	6.25	39.2	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11	C
24	Hupmobile...6 R-915	.....	115	6.00/16	6-3½x4¼	29.4	245.3	101-3600	5.75	....	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.27	C
25	Hupmobile Six..922E	995	122	6.25/16	6-3½x4¼	29.4	245.3	101-3600	5.75	40.9	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.54	C
26	Hupmobile, 8...925H	1145	125	6.50/16	8-3 1/16x4 3/4	32.5	303.2	120-3500	5.80	44.0	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.Long	WG	m-UP	½ Spi	4.54	C
27	La Salle....V8, 39-50	1320	120	7.00/16	8-3 5/8x4½	36.4	322.0	125-3400	6.25	41.4	CI	Mor	Ala	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
28	Lincoln.....V12	.....	136-145	7.50/17	12-3 1/8x4½	46.8	414.0	150-3400	6.38	39.0	Al	Mor	Al	Pur	AC	Str	Old	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C
29	Lincoln-Zephyr.....	1360‡	125	7.00/16	12-2¾x3¾	36.3	267.0	110-3900	6.70	40.6	Al	Dia	CS	Fram	....	Str	Old	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
30	Mercury.....8	934‡	116	6.00/16	8-3.185x3‡	32.5	239.0	95-3600	6.15	....	CI	Dia	CS	.....	AC	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.54	Tr
31	Nash Lafay.....3910	840	117	6.00/16	6-3 5/8x4 3/8	27.3	234.8	99-3400	6.30	36.2	CI	Whit	Als	No	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10	C
32	Nash...Amb. 6, 3920	985	121	6.25/16	6-3 5/8x4 3/8	27.3	234.8	105-3400	6.00	35.0	CI	Whit	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	m-Mec	½ Own	4.10	C
33	Nash...Amb. 8, 3980	1235	125	7.00/16	8-3 1/16x4¼	31.2	260.8	115-3400	6.00	34.9	CI	Dia	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	m-Mec	½ Own	4.10	C
34	Oldsmobile.....60	889	115	6.00/16	6-3 7/16x3 7/8	28.4	216.0	90-3200	6.20	39.0	CI	Whit	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
35	Oldsmobile.....70	952	120	6.00/16	6-3 7/16x4 1/16	28.4	229.7	95-3300	6.10	39.3	CI	Whit	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
36	Oldsmobile.....80	1043	120	6.50/16	8-3¼x3 7/8	33.8	257.1	110-3500	6.20	41.1	CI	LB	Ala	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30	IC
37	Overland.....	595‡	102	5.00/16	4-3 1/8x4 3/8	15.6	134.2	61-3600	6.35	....	CI	LB	Al	No	AC	Til	Mac	AL	USL	P.Long	WG	m-UP	½ Own	4.30	C
38	Packard Six....1700	1095	122	6.50/16	6-3½x4¼	29.4	245.3	100-3200	6.52	40.7	CI	Mor	Als	Pur	Op	CG	Wal	DR	Wil	P	Own	Nb-Mec	½ Own	4.54	IC
39	Packard Eight.1701-2	1295	127, 148	7.00/16	8-3¼x4¼	33.8	282.0	120-3600	6.41	41.8	CI	Mor	Als	Pur	AC	Str	Wal	AL	PD	P	Own	Nb-Mec	½ Own	(b)	IC
40	Pack. Sup. 8..1703-5	2035	127, 148	7.00/16	8-3 5/16x5	32.5	320.0	130-3200	6.45	43.9	CI	Mor	Als	Pur	AC	Str	Wal	AL †	PD	P	Own	Nb-Mec	½ Own	(s)	IC
41	Pack. Twelve..1707-8	4155	134, 39	8.25/16	12-3 7/16x4¼	56.7	473.0	175-3200	6.30	....	Al	Mor	Als	Pur	AC	Str	Old	AL †	PD	P	Own	Nb-Spi	½ Own	4.41	IC
42	Plymouth.....P7	726	114	5.50/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	35.9	CI°	Mor	Ala	No	....	Car	NS	AL	Wil	P.B&B	Own	.....	½ Own	3.90	IC
43	Plymouth.....P8	791	114	6.00/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	35.4	CI°	Mor	Ala	Pur	....	Car	NS	AL	Wil	P.B&B	Own	.....	½ Own	4.10	IC
44	Pontiac 6.....39-25	866	115	6.00/16	6-3 7/16x4	28.3	222.7	85-3520	6.20	38.4	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.10	IC
45	Pontiac 6.....39-26	922	120	6.00/16	6-3 7/16x4	28.3	222.7	85-3520	6.20	36.4	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.10	IC
46	Pontiac 8.....39-28	970	120	6.50/16	8-3¼x3 3/4	33.8	248.9	100-3700	6.20	40.9	CI	Mor	CHI	No	AC	Car	Var	DR	Del	P.In	Own	Rb-Mec	½ Own	4.30	IC
47	Studebaker..Com. 9A	965	116½	6.00/16	6-3 1/8x4 3/8	26.3	226.0	90-3400	6.00	40.7	CI	Dia	Ly	Fram	AC	Str	Buf	AL	Wil	P.B&B	WG	Nb-Spi	½ Spi	4.55	IT
48	Studebaker..Pres. 5C	1110	122	6.50/16	8-3 1/16x4¼	30.0	250.4	110-3600	6.00	41.4	CI	Dia	Ly	Fram	AC	Str	Old	DR	Wil	P.In	WG	Nb-Spi	½ Spi	4.55	IT
49	Willys-48.....	555‡	100	5.50/16	4-3 1/8x4 3/8	15.6	134.2	48-3200	5.70	32.3	CI°	LB	CI	F-O	AC	Til	Buf	AL	USL	P.R-B	WG	m-UP	½ Own	4.30	C

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
(1)—½ in. on Flywheel rim before TC
½—Semi-floating
¾—Three-quarter floating
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.
(a)—(−¼ to +¾)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced **Al**—Aluminum
Aia—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic
(b)—4.36-1701; 4.70-1702
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—1−⅛, 1−⅛ **C**—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
CI—Cast Iron **CS**—Cast Steel
CSM—Chain sproket markings
(d)—0+0−½ (e)—0+1/16−0
(f)—1/16±1/16−0
F—Floating (Piston Pin)
FF—Full floating
H—Hot (tappet clearance)
(i)—4900-5100 **IC**—Independent coil
IT—Independent Transverse
Ly—Lynite
m—Metal with anti-friction bearings
M—Mechanical **N**—Negative
Nb—Needle bearing
(nn)—N1¼ to N2¼ on 61, N1¼ to N1¼ on 60S
(np)—N1¼ to +¾ on 61, N1¼ to +½ on 60S
(nr)—5°6′ on 61, 5°44′ on 60S
p—Plain bearing
P—Piston (Pin Locked in)
P—Single plate clutch
R—Rod (Pin locked in)
(r)—Out only **Ru**—Rubber
Rb—Roller Bearing
(s)—4.36-1703, 4.54-1705
(t)—½±¾−0 **TC**—Top Center
Tr—Transverse **Var**—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS No. and Width Comp.	RINGS No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES Head Diameter and Seat Angle Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance Inlet	Operating Tappet Clearance Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C. No. of Degrees	No. of Flywheel Teeth	IGNITION Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing Spark Occurs °TC	Timing No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OM	R	90	AL-A9	2–$\frac{3}{32}$	1–$\frac{1}{8}$	$\frac{29}{64}$	R	1$\frac{1}{32}$	45	1$\frac{1}{32}$	45	.279	.006H	.009H	.011	19B	4$\frac{1}{4}$B	.022	.025	(1)	1B	Au	A	1$\frac{1}{16}$	1$\frac{1}{4}$	3	4	11	1$\frac{1}{4}$	$\frac{1}{16}$–$\frac{1}{8}$	1$\frac{1}{2}$	1
OH	S	112	AC-46	2(c)	2–$\frac{3}{16}$	$\frac{13}{16}$	R	1$\frac{17}{32}$	45	1$\frac{11}{32}$	45	.372	.015H	.015H	††	13B	5$\frac{1}{4}$B	.015	.025	4B	1$\frac{1}{2}$B	Au	A	2	1.21	6	13$\frac{1}{4}$	N$\frac{1}{4}$±$\frac{1}{2}$	−$\frac{1}{4}$, +1	0–$\frac{1}{16}$	3$\frac{1}{2}$–4$\frac{1}{2}$	2
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{15}{32}$	45	1$\frac{7}{16}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2$\frac{1}{2}$B	Au	A	2$\frac{1}{4}$	1.31	8	17	N$\frac{1}{4}$±$\frac{1}{2}$	−$\frac{1}{4}$, +1	0–$\frac{1}{16}$	3$\frac{1}{2}$–4$\frac{1}{2}$	3
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{15}{32}$	45	1$\frac{7}{16}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2$\frac{1}{2}$B	Au	A	2$\frac{1}{4}$	1.31	8	17	N$\frac{1}{4}$±$\frac{1}{2}$	−$\frac{1}{4}$, +1	0–$\frac{1}{16}$	4$\frac{1}{2}$–5$\frac{1}{2}$	4
OH	S	114	AC-46	2(c)	2–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{15}{32}$	45	1$\frac{7}{16}$	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	2$\frac{1}{2}$B	Au	A	2$\frac{1}{4}$	1.31	8	17	N$\frac{1}{4}$±$\frac{1}{2}$	−$\frac{1}{4}$, +1	0–$\frac{1}{16}$	4–5	5
BH	S	155x	AC-104	2(c)	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2$\frac{1}{4}$B	Au	A	2.46	2$\frac{1}{2}$	7	....	(nn)	(np)	$\frac{1}{32}$–$\frac{3}{32}$	(nr)	6
BH	S	170x	AC-104	2(c)	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2$\frac{1}{4}$B	Au	A	2.46	2$\frac{1}{2}$	7	....	0–±$\frac{1}{4}$	0–$\frac{1}{2}$	$\frac{1}{32}$–$\frac{3}{32}$	5° 1′	7
BH	S	180x	AC-104	2(c)	1–$\frac{1}{16}$	$\frac{13}{16}$	R	1.50	45	1.37	45	.341	AA	AA	AA	6B	2$\frac{1}{2}$B	.015	.032	6B	2$\frac{1}{2}$B	Au	A	2	1$\frac{3}{4}$	11	....	0–±$\frac{1}{4}$	0–$\frac{1}{2}$	$\frac{1}{32}$–$\frac{3}{32}$	5° 1′	8
OH	O	....	AC-46	2–$\frac{1}{16}$	1–$\frac{3}{16}$	.865	R	1$\frac{41}{64}$	30	1$\frac{13}{32}$	30	.340	.006H	.013H	.006	9B	3$\frac{1}{2}$B	.021	.040	5B	2B	Au	A	2$\frac{5}{16}$	1$\frac{5}{16}$	5	14	2$\frac{1}{4}$±$\frac{1}{2}$	1±$\frac{1}{2}$	$\frac{1}{64}$–$\frac{1}{8}$	7°10′	9
OH	O	....	AC-46	2–$\frac{1}{16}$	1–$\frac{3}{16}$	.865	R	1$\frac{41}{64}$	30	1$\frac{13}{32}$	30	.340	.006H	.013H	.006	9B	3$\frac{1}{2}$B	.021	.040	5B	2B	Au	A	2$\frac{5}{16}$	1$\frac{5}{16}$	5	14	0±$\frac{1}{2}$	N$\frac{1}{4}$±$\frac{1}{2}$	0–$\frac{1}{16}$	4$\frac{3}{4}$	10
LH	G	145x	AL-A7	2–$\frac{1}{16}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{33}{64}$	45	1$\frac{17}{32}$	45	.340	.010H	.010H	.014	8B	3$\frac{1}{4}$B	.020	.025	TC	TC	Au	A	2$\frac{1}{8}$	1$\frac{7}{32}$	5	17	$\frac{1}{2}$–2$\frac{1}{2}$	(a)	0–$\frac{1}{8}$	4$\frac{3}{4}$–6	11
LH	G	145x	AL-A7	2–$\frac{1}{16}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{33}{64}$	45	1$\frac{17}{32}$	45	.340	.006H	.010H	.011	6B	2$\frac{1}{2}$B	.018	.025	3B	1$\frac{1}{4}$B	Au	A	2$\frac{3}{16}$	1$\frac{3}{8}$	6	20	N$\frac{1}{2}$, +$\frac{1}{2}$	− to+$\frac{1}{2}$	0–$\frac{1}{8}$	4$\frac{3}{4}$–6	12
LH	G	155x	AL-A7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{11}{32}$	45	1$\frac{11}{32}$	45	.340	.008H	.010H	.011	6B	2$\frac{1}{2}$B	.018	.025	.....	.....	Au	A	2$\frac{3}{16}$	1$\frac{3}{8}$	6	24	1–3	−$\frac{1}{4}$ to+$\frac{1}{2}$	0–$\frac{1}{8}$	4$\frac{3}{4}$–6	13
LH	G	145x	AL-A7	2–$\frac{1}{16}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{21}{64}$	45	1$\frac{17}{32}$	45	.340	.008H	.010H	.014	8B	3$\frac{1}{4}$B	.020	.025	TC	TC	Au	A	2$\frac{1}{8}$	1$\frac{7}{32}$	5	19	$\frac{1}{2}$–2$\frac{1}{2}$	(a)	0–$\frac{1}{8}$	4$\frac{3}{4}$–6	14
LH	G	140x	AL-A7	2–$\frac{1}{16}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{15}{32}$	45	1$\frac{15}{32}$	45	.340	.006H	.008H	.011	6A	2$\frac{1}{2}$A	.020	.025	4A	1$\frac{1}{2}$A	Au	A	2$\frac{1}{16}$	1	5	15	N$\frac{1}{2}$,+1$\frac{1}{2}$	N$\frac{1}{4}$−+$\frac{1}{2}$	0–$\frac{1}{8}$	5$\frac{1}{4}$–6$\frac{1}{2}$	15
LH	G	150y	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{5}{32}$	.687	F	1.28	45	1.28	45	.279	.013C	.013C	.013	9$\frac{1}{2}$B	3$\frac{1}{4}$B	.015	.025	4B	1$\frac{1}{2}$B	Au	..	1.60	1.54	4	15.2	8	1	$\frac{1}{16}$–$\frac{1}{8}$	8	16
LH	G	100	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{5}{32}$	.750	F	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.310	.013C	.013C	.013	TC	TC	.015	.025	4B	1$\frac{1}{2}$B	Au	A	2	1.75	5	22	8	1	$\frac{1}{16}$–$\frac{1}{8}$	8	17
OH	R	160x	Ch-H-10	2–$\frac{3}{32}$	2–$\frac{5}{32}$	$\frac{13}{16}$	R	1$\frac{23}{64}$	30	1$\frac{21}{64}$	45	$\frac{5}{16}$	.010H	.010H	.012	4$\frac{1}{2}$B	1$\frac{1}{2}$B	.018	.025	TC	TC	Au	A	2$\frac{1}{16}$	$\frac{5}{16}$	5	13$\frac{1}{2}$	3–4	1	$\frac{1}{16}$–$\frac{3}{16}$	7$\frac{1}{2}$	18
OH	R	120	Ch-H-10	2–$\frac{3}{32}$	2–$\frac{5}{32}$	$\frac{13}{16}$	R	1$\frac{23}{64}$	30	1$\frac{21}{64}$	45	$\frac{5}{16}$	.010H	.010H	.012	4$\frac{1}{2}$B	1$\frac{1}{2}$B	.018	.025	4A	1$\frac{1}{2}$A	Au	A	2$\frac{1}{16}$	1$\frac{3}{16}$	5	13$\frac{1}{2}$	3–4	1	$\frac{1}{16}$–$\frac{3}{16}$	7$\frac{1}{2}$	19
BH	G	115	Ch-J-8	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006H	.008H	.010	10$\frac{2}{3}$B	4B	.020	.032	2$\frac{1}{2}$	9$\frac{1}{4}$	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4$\frac{1}{2}$	12$\frac{1}{8}$	1–2	1–1$\frac{1}{2}$	0–$\frac{1}{8}$	7	20
BH	G	120	Ch-J-8	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006H	.008H	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4$\frac{1}{2}$	12$\frac{1}{2}$	1–2	1–1$\frac{1}{2}$	0–$\frac{1}{8}$	7	21
BH	G	120	Ch-J-8	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{3}{8}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006H	.008H	.010	10$\frac{2}{3}$B	4B	.020	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	4$\frac{1}{2}$	12$\frac{1}{2}$	1–2	1–1$\frac{1}{2}$	0–$\frac{1}{8}$	7	22
BH	G	118	Ch-J-8	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{3}{4}$	F	1$\frac{1}{2}$	45	1$\frac{3}{8}$	45	$\frac{11}{32}$	.006H	.008H	.010	10$\frac{2}{3}$B	4B	.017	.032	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{3}{8}$	7	17$\frac{1}{2}$	1–2	1–1$\frac{1}{2}$	0–$\frac{1}{8}$	7	23
LH	G	107	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{64}$	45	1$\frac{17}{32}$	45	.341	.010	.014	.013	2B	$\frac{1}{2}$B	.022	.028	7B	2$\frac{1}{4}$B	....	A	2$\frac{1}{8}$	1$\frac{1}{4}$	6	18	.....	.....	.....	.....	24
LH	G	107	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{64}$	45	1$\frac{17}{32}$	45	.341	.010	.013	.014	2B	$\frac{1}{2}$B	.022	.028	7B	2$\frac{1}{4}$B	Au	A	2$\frac{1}{8}$	1$\frac{1}{4}$	6	18	1$\frac{1}{2}$	1	$\frac{1}{16}$–$\frac{3}{16}$	7$\frac{1}{2}$	25
LH	G	113	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{17}{32}$	45	1$\frac{13}{32}$	45	.341	.006	.013	.010	1B	$\frac{1}{3}$B	.015	.028	7B	2B	Au	B	2$\frac{1}{4}$	1$\frac{1}{4}$	8	21.5	1$\frac{1}{2}$	1$\frac{1}{4}$	$\frac{1}{16}$–$\frac{1}{16}$	8$\frac{1}{2}$	26
BH	S	155x	AC-104	2(c)	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2$\frac{1}{4}$B	Au	A	2$\frac{1}{3}$	2$\frac{1}{32}$	7	....	N$\frac{1}{4}$–N2$\frac{1}{4}$	0–$\frac{3}{4}$	$\frac{1}{32}$–$\frac{3}{32}$	5° 6′	27
OM	O	105	Ch-7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{13}{16}$	45	1$\frac{11}{16}$	45	$\frac{5}{16}$	AA	AA	AA	21B	6$\frac{3}{4}$B	.020	.029	7B	2$\frac{1}{4}$B	Au	B	2$\frac{1}{2}$	2	12	32	1$\frac{1}{2}$	1	$\frac{1}{16}$–$\frac{1}{8}$	7$\frac{1}{2}$	28
BH	G	105	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{3}{4}$	F	1.54	45	1.45	45	.311	AA	AA	AA	19$\frac{1}{2}$B	6B	.015	.029	4B	1$\frac{1}{4}$B	Au	A	2$\frac{1}{8}$	1.57	5	30	4	$\frac{3}{4}$	$\frac{3}{16}$	4	29
BH	G	....	Ch-H-10	2–$\frac{3}{32}$	1–$\frac{5}{32}$	$\frac{3}{4}$	F	1$\frac{17}{32}$	45	1$\frac{1}{32}$	45	.310	.013C	.013C	.013	TC	TC	.015	.025	4B	1$\frac{1}{4}$B	Au	A	2.14	1.75	5	....	.....	.....	.....	.....	30
BH	G	110	AL-B7	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{17}{32}$	45	.340	.015	.015	.015	CSM	CSM	.020	.025	TC	TC	Au	A	2	1.42	6	20	1–2	0–1$\frac{1}{2}$	0–$\frac{1}{16}$	7	31
BH	G	125	AC-45	2–$\frac{1}{8}$	2–$\frac{3}{32}$	$\frac{7}{8}$	F	1$\frac{3}{4}$	45	1$\frac{15}{32}$	45	.372	.015	.015H	.015	CSM	CSM	.020	.025	4B	1$\frac{1}{4}$B	Au	A	2	1.42	6	16	1–2	0–1$\frac{1}{2}$	0–$\frac{1}{16}$	7	32
BH	G	110	AC-45	2–$\frac{1}{8}$	1–$\frac{1}{8}$ / 1–$\frac{2}{16}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{15}{32}$	45	.372	.015H	.015H	.015	CSM	CSM	.020	.025	9B	2$\frac{1}{2}$B	Au	B	2	1.24	7	17	1–2	0–1$\frac{1}{2}$	0–$\frac{1}{16}$	7	33
BH	S	151x	AC-45	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{55}{64}$	P	1$\frac{9}{16}$	30	1$\frac{27}{64}$	45	$\frac{11}{32}$	.008H	.011H	....	5B	2B	.020	.040	TC	TC	Au	A	2$\frac{1}{8}$	1$\frac{3}{8}$	5	17	0–N$\frac{3}{4}$	$\frac{1}{8}$–1	$\frac{1}{8}$–$\frac{3}{16}$	4° 51′	34
BH	S	146x	AC-45	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{55}{64}$	P	1$\frac{9}{16}$	30	1$\frac{27}{64}$	45	$\frac{11}{32}$	.008H	.011H	.012	5B	2B	.020	.040	TC	TC	Au	A	2$\frac{1}{8}$	1$\frac{3}{8}$	5	17	0–N$\frac{3}{4}$	$\frac{1}{8}$–1	$\frac{1}{8}$–$\frac{3}{16}$	4° 51′	35
BH	S	152x	AC-45	2–$\frac{3}{32}$	2–$\frac{3}{16}$	$\frac{55}{64}$	P	1$\frac{9}{16}$	30	1$\frac{27}{64}$	45	$\frac{11}{32}$	.008H	.011H	.012	TC	TC	.015	.030	2B	$\frac{3}{4}$B	Au	A	2$\frac{1}{8}$	1$\frac{3}{8}$	6	24	0–N$\frac{3}{4}$	$\frac{1}{8}$–1	$\frac{1}{8}$–$\frac{3}{16}$	4° 51′	36
LH	G	105	Ch-J-8	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{13}{16}$	R	1$\frac{13}{32}$	45	1$\frac{15}{32}$	45	.373	.014C	.016C	.020	9B	2$\frac{1}{2}$B	.020	.025	TC	TC	Au	A	1$\frac{13}{16}$	1$\frac{5}{16}$	4	11$\frac{3}{4}$	3	2	$\frac{1}{16}$–$\frac{1}{8}$	7$\frac{1}{2}$	37
H	O	110	AC-103 (z)	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	F	1.57	30	1$\frac{13}{32}$	45	.340	.007H	.010H	.012	1B	$\frac{1}{2}$B	.020	.028	6B	2$\frac{1}{2}$B	Au	A	2$\frac{3}{32}$	1$\frac{1}{4}$	5	15	1$\frac{1}{2}$±$\frac{1}{2}$	(t)	(e)	1° 54′	38
H	O	110	AC-103 (z)	2–$\frac{1}{8}$	1–$\frac{1}{16}$	$\frac{7}{8}$	F	1$\frac{17}{32}$	30	1$\frac{13}{32}$	45	.340	.007H	.010H	.012	1B	$\frac{1}{2}$B	.015	.028	8B	3B	Au	A	2$\frac{3}{32}$	1$\frac{1}{4}$	6	16	1$\frac{1}{2}$±$\frac{1}{2}$	(t)	(e)	1° 54′	39
H	O	110	AC-103 (z)	2–$\frac{1}{8}$	2–$\frac{3}{32}$	$\frac{7}{8}$	F	1$\frac{21}{32}$	45	1$\frac{15}{32}$	45	.340	.006H	.008H	.005	26B	10°B	.015	.028	7B	3B	Au	B	2$\frac{1}{16}$	1$\frac{3}{32}$	7$\frac{1}{2}$	22	0±$\frac{1}{2}$	(t)	(e)	1° 54′	40
BPH	O	110	AC-103 (z)	3–$\frac{1}{8}$	1–$\frac{3}{32}$	$\frac{7}{8}$	F	1$\frac{41}{64}$	45	1$\frac{13}{32}$	45	.340	AA	AA	....	TC	TC	.020	.028	6B	2$\frac{1}{2}$B	Au	B	2$\frac{1}{2}$	1$\frac{5}{8}$	10	40	(d)	1±$\frac{1}{4}$	(f)	1° 30′	41
LH	G	145x	Ch-J-8	2–$\frac{1}{8}$	2–$\frac{5}{32}$	$\frac{55}{64}$	F	1$\frac{15}{32}$	45	1$\frac{15}{32}$	45	.340	.006H	.008H	.011	6A	2$\frac{1}{2}$A	.020	.025	.....	.....	Au	A	1$\frac{15}{16}$	1	5	14	−$\frac{1}{2}$to+$\frac{1}{2}$	−$\frac{1}{2}$to+$\frac{1}{2}$	0–$\frac{1}{8}$	5$\frac{1}{4}$–6$\frac{1}{2}$	42
LH	G	145x	AL-A-7	2–$\frac{1}{8}$	2–$\frac{3}{32}$	$\frac{55}{64}$	F	1$\frac{15}{32}$	45	1$\frac{15}{32}$	45	.340	.006H	.008H	.011	6A	2$\frac{1}{2}$A	.020	.025	.....	.....	Au	A	1$\frac{15}{16}$	1	5	14	−$\frac{1}{2}$to+$\frac{1}{2}$	−$\frac{1}{2}$to+$\frac{1}{2}$	0–$\frac{1}{8}$	5$\frac{1}{4}$–6$\frac{1}{2}$	43
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{19}{32}$	30	1$\frac{15}{32}$	45	.310	.012H	.012H	.015	5B	2B	.021	.025	4B	1$\frac{1}{2}$B	Au	A	2$\frac{1}{8}$	1$\frac{9}{32}$	6	16	N$\frac{3}{4}$–N1$\frac{1}{4}$	$\frac{3}{4}$–1$\frac{1}{4}$	0–$\frac{1}{16}$	4° 51′	44
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{19}{32}$	30	1$\frac{15}{32}$	45	.310	.012H	.012H	.015	5B	2B	.021	.025	4B	1$\frac{1}{2}$B	Au	A	2$\frac{1}{8}$	1$\frac{9}{32}$	6	16	N$\frac{3}{4}$–N1$\frac{1}{4}$	$\frac{3}{4}$–1$\frac{1}{4}$	0–$\frac{1}{16}$	4° 51′	45
BH	S	141x	AC-45	2–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	P	1$\frac{13}{32}$	30	1$\frac{13}{32}$	45	.310	.012H	.012H	.015	5B	2B	.015	.025	4B	1$\frac{1}{2}$B	Au	A	2	1$\frac{1}{16}$	7	19	N$\frac{3}{4}$–N1$\frac{1}{4}$	$\frac{3}{4}$–1$\frac{1}{4}$	0–$\frac{1}{16}$	4° 51′	46
LH	R	105	Ch-8	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{15}{32}$	45	1$\frac{9}{32}$	45	$\frac{11}{32}$	.016C	.016C	.020	15B	5$\frac{1}{2}$B	.020	.025	2B	$\frac{3}{4}$B	Au	A	2$\frac{3}{8}$	1$\frac{3}{8}$	6	14$\frac{1}{2}$	N$\frac{1}{4}$,+$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$–$\frac{7}{32}$	5$\frac{1}{2}$	47
LH	R	105	Ch-8	2–$\frac{1}{8}$	1–$\frac{3}{16}$	$\frac{7}{8}$	R	1$\frac{13}{32}$	45	1$\frac{9}{32}$	45	$\frac{11}{32}$	.016C	.016C	.020	15B	5$\frac{1}{2}$B	.020	.025	TC	TC	Au	A	1$\frac{7}{8}$	1$\frac{3}{16}$	8	17	N$\frac{1}{4}$,+$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$–$\frac{7}{32}$	5$\frac{1}{2}$	48
BM	G	87	Ch-J-8	3–$\frac{3}{32}$	1–$\frac{3}{16}$	$\frac{15}{16}$	F	1$\frac{17}{32}$	45	1$\frac{15}{32}$	45	.371	.004H	.006H	.010	TC	TC	.020	.025	5A	1$\frac{1}{2}$A	Au	A	1$\frac{13}{16}$	1$\frac{5}{16}$	4	11	3	2	$\frac{3}{32}$	7$\frac{1}{2}$	49

MAKES OF UNITS

†—Starter Motor—Owen-Dyneto
AC—AC Spark Plug Co.
AL—Auto-Lite
BC—Carter and Chandler-Groves
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—Bendix, Mechanical
BPH—Bendix, power operated, hydraulic **BS**—Briggs & Stratton
Buf—Buffalo Pressed Steel
Car—Carter
Ch—Champion **Del**—Delco
Dia—Continental Diamond Fiber
Det—Detroit **Exi**—Exide
DR—Delco-Remy **G**—Gemmer
Ge—General Electric Co.
GED—General Electric or Continental Diamond Fibre
In—Inland **LB**—Link Belt
LH—Lockheed hydraulic
Ly—Lynite
Mac—MacKenzie Muffler Co.
Mar—Marvel **Mec**—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own **OH**—Own hydraulic
Old—Oldberg
OM—Own, mechanical
Op—Optional
Os—Own, semi-centrifugal
PD—Prest-O-Lite or Delco
Pur—Purolator **R**—Ross
R-B—Rockford with Borg & Beck disk **Ro**—Rockford
S—Saginaw
Spi—Spicer **Ste**—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard
(z)—Or Champion **Y**—4

Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford, Lincoln and Willys. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BANTAM		
Std. Coupe	399	1250
Spec. Roadster	449	1200
Pickup Truck	465	1245
DeLuxe Coupe	469	1265
Std. Roadster	479	1200
Panel Truck	479	1330
Std. Sed., 4p	497½	1270
Std. Del.	497½	1265
DeL. Roadster	525	1200
DeL. Del.	549	1265
DeL. Sed., 4p	549	1270
Stat. Wagon	565	1400
BUICK		
Series 40		
Bus. Coupe	894	3322
Sport Coupe	950	3372
Tour. Sedan, 2d.	955	3417
Tour. Sed., 4d.	996	3482
Conv. Coupe	1077	3642
Sport Phaeton	1406	3452
Series 60		
Sport Coupe	1175	3637
Tour. Sed., 2d.	1205	
Tour. Sed., 4d.	1246	3782
Conv. Coupe	1343	3712
Sport Phaeton	1713	3917
Series 80		
Tr. Sd., trk., 4d.	1543	4247
Sport Sedan, 4d.	1543	
Formal Sed., 4d.	1758	4312
Sport Phae., 4d.	1983	4392
Series 90		
Tr. Sd., 4d, 6p.	2074	4568
Tr. Sd., 4d, 8p.	2350	4608
Limo., 4d, 8p.	2453	4653
CADILLAC		
Series 61		
Coupe	1610	
Sedan, 4d	1680	3770
Conv. Coupe	1770	
Conv. Sedan	2170	3810
Series 60-S		
Tour. Sedan, 5p.	2090	4110
Series 75		
Tour. Sedan, 5p.	2995	4785
Bus. Tr. Sed., 8p	3105	4865
Tour. Sed. Div.	3155	4845
Tour. Sedan, 7p.	3210	4865
Bus. Tr. Imp., 8p	3260	5025
Coupe, 2p.	3280	
Tour. Sedan, 7p.	3360	
Coupe, 3-5p.	3380	4695
Conv. Coupe, 2p.	3380	
Tour. Sedan, 5p.	3635	4820
Conv. Sed., Trk.	3945	5030
Formal Sed., 5p.	3995	4785
Formal Sed., 7p.	3995	
Town Car, 7p.	5115	5095
Series 90		
Sedan, 5p.	5140	5105
Tour. Sed. Div.	5215	5165
Tour. Sedan, 7p.	5270	5185
Coupe, 2p.	5340	4915
Imp. Tr. Sed., 7p	5420	5345
Coupe, 5p.	5440	5015
Conv. Coupe	5440	4905
Town Sedan, 5p.	5695	5140
Conv. Sed., Trk.	6000	5350
Formal Sed., 5p.	6055	5105
Formal Sed., 7p.	6055	5345
Town Car, 7p.	7175	5415
CHEVROLET		
Master 85		
Bus. Coupe	628	2780
Coach, 2d	648	
Town Sedan, 2d.	669	2820
Sedan, 4d	689	2805
Sport Sedan, 4d.	710	2845
CHEVROLET (Cont.)		
Master De Luxe		
Bus. Coupe	684	2845
Coach, 2d	699	
Coupe, 2-4p	715	2845
Town Sedan, 2d.	720	2875
Sedan, 4d	745	2875
Sport Sedan, 4d.	766	2910
CHRYSLER		
Royal Six		
Coupe	918	3120
Vict. Coupe	970	3160
Brougham	975	3200
Sedan	1010	3265
Sedan, 7p	1235	3520
Limousine	1325	
Royal Windsor Six		
Sedan	1075	3275
Imperial Eight		
Coupe	1123	3520
Vict. Coupe	1160	3555
Brougham	1165	3610
Sedan	1198	3640
New Yorker Imp. 8		
Sedan	1298	3695
Saratoga Imp. 8		
Sedan	1443	
Custom Imp. 8		
Sedan	2595	
Sedan, 7p	2595	
Limousine	2695	
DE SOTO		
De Luxe		
Bus. Coupe	870	3064
Coupe, 2-4p	925	3089
Tour. Sedan, 2d.	930	3129
Tour. Sedan, 4d.	970	3174
Tour. Sedan, 7p.	1195	
Limousine, 7p.	1285	
Custom		
Coupe	923	3069
Coupe, 2-4p	978	3094
Tour. Sedan, 2d.	983	3134
Tour. Sedan, 4d.	1023	3179
Tour. Sedan, 7p.	1248	
Limousine, 7p.	1338	
DODGE		
Special		
Coupe	756	2895
Sedan, 2d	815	2935
Sedan, 4d	855	2960
De Luxe		
Coupe	803	2940
Coupe, 2-4p	860	2970
Sedan, 2d	865	3020
Sedan, 4d	905	3045
Sedan, 7p	1095	3420
Limousine	1185	
FORD		
V8-60		
Coupe	580	
Tudor Sedan	620	
Fordor Sedan	665	
V8-85		
Coupe	620	
Tudor Sedan	660	
Fordor Sedan	705	
FORD (Cont.)		
De Luxe 85		
Coupe	680	
Tudor Sedan	720	
Fordor Sedan	765	
Conv. Coupe	765	
Conv. Sedan	895	
GRAHAM		
Special 96		
Comb. Coupe	940	
Sedan, 2d	940	
Sedan, 4d	965	
Custom 96		
Comb. Coupe	1070	
Sedan, 2d	1070	
Sedan, 4d	1195	
Sup'charger 97		
Comb. Coupe	1070	
Sedan, 2d	1070	
Sedan, 4d	1195	
Custom Sup'charger 97		
Comb. Coupe	1200	
Sedan, 2d	1200	
Sedan, 4d	1325	
HUDSON		
112-90		
Coupe, 3p	745	2587
Brougham		
Vict. Coupe	791	2622
Tour. Brougham	775	2682
Sedan		
Tour Sedan	806	2712
Conv. Coupe	886	
Conv. Brougham	936	
112-98		
Sedan		
Tour. Sedan		
Six-92		
Coupe, 3p	823	2757
Brougham		
Vict. Coupe	869	2787
Tour. Brougham	856	2847
Sedan		
Tour. Sedan	898	2897
Conv. Coupe	972	
Conv. Brougham	1032	
Country Club Six-93		
Coupe, 3p	919	2848
Brougham		
Vict. Coupe	967	2893
Tour. Brougham	960	2968
Sedan		
Tour. Sedan	995	3023
Conv. Coupe	1052	
Conv. Brougham	1115	
Country Club Eight-95		
Coupe, 3p	1009	3003
Brougham		
Vict. Coupe	1051	3053
Tour. Brougham	1049	3138
Sedan		
Tour. Sedan	1079	3193
Conv. Coupe	1138	
Conv. Brougham	1201	
Country Club Eight-97		
Sedan		
Tour. Sedan	1174	3268
HUPMOBILE		
Big Six-922E		
De Luxe Sedan	995	3400
Custom Sedan	1095	3440
Eight-925H		
De Luxe Sedan	1145	4085
Custom Sedan	1245	4215
LA SALLE		
Coupe	1240	
Sedan, 2d	1280	
Sedan, 4d	1320	3740
Conv. Coupe	1395	
Conv. Sedan	1800	3780
LINCOLN		
V12—136 in. wb.		
Sedan, 4d	4900	5735
Conv. Roadster	5300	
Coupe	5300	5435
Wilby Coupe	5900	5615
Brunn Victoria	5900	5530
V12—145 in. wb.		
Sedan	5100	5880
Limousine	5200	5970
Conv. Sed. LeB.	5800	5670
Wilby. Tour. Sed.	5900	
Conv. Sed. LeB.	6000	5780
Jud. Berline	6000	5770
Jud. Berline	6100	5840
Wilby. Limo.	6200	6140
Jud. Sed. Limo.	6300	5950
Brunn Cabriolet	6900	6010
Brunn Cabriolet	7000	6030
Wilby. Sport Sed.	7000	6030
Brunn Brougham	7000	6120
Brunn Tour. Cab.	7200	5870
Wilby. Panel Bro.	7400	
LINCOLN-ZEPHYR		
Standard		
Coupe	1320	
Coupe Sed., 2d.	1330	
Sedan, 4d	1360	
Conv. Coupe	1700	
Conv. Sedan	1790	
Custom		
Coupe	1450	
Coupe Sedan	1480	
Sedan, 4d	1510	
Limousine	1700	
MERCURY 8		
Sedan, 2d	894	
Sed. Coupe, 2d	934	
Town Sedan, 4d.	934	
Sport Conv.	994	
NASH		
Nash-La Fayette Special		
Bus. Coupe	770	
Sedan, 2d	810	
Sedan, 4d	840	
Sedan, 4d, trk.	840	
De Luxe		
Bus. Coupe		
Vict. Sedan, 2d.	825	
Sedan, 2d	855	
A. P. Coupe	860	
Sedan, 4d	885	
Sedan, 4d, trk.	885	
NASH (Cont.)		
Ambassador Six		
Bus. Coupe	925	
Vict. Sedan, 2d.	955	
A. P. Coupe	960	
Sedan, 4d	985	
Sedan, 4d, trk.	985	
Ambassador Eight		
Bus. Coupe	1175	
Vict. Sedan, 2d.	1205	
A. P. Coupe	1210	
Sedan, 4d	1235	
Sedan, 4d, trk.	1235	
OLDSMOBILE		
Six-Series 60		
Bus. Coupe	777	2870
Club Coupe	833	2915
Sedan, 2d	838	2965
Sedan, 4d	889	3000
Six-Series 70		
Bus. Coupe	840	3040
Club Coupe	891	3080
Sedan, 2d	901	3140
Sedan, 4d	952	3180
Conv. Coupe	1045	3230
Eight-Series 80		
Bus. Coupe	920	3190
Club Coupe	971	3230
Sedan, 2d	992	3290
Sedan, 4d	1043	3340
Conv. Coupe	1119	3390
OVERLAND		
Speedway		
Coupe	560	
Sedan, 2d	580	
Sedan, 4d	595	
De Luxe		
Coupe	610	
Sedan, 2d	630	
Sedan, 4d	655	
PACKARD		
Six-1700		
Bus. Coupe	1000	3295
Club Coupe	1045	3365
Tour. Sedan, 2d	1065	3390
Tour. Sedan, 4d	1095	3400
Conv. Coupe	1195	3385
Eight-1701		
Bus. Coupe	1200	3490
Club Coupe	1245	3535
Tour. Sedan, 2d	1265	3595
Tour. Sedan, 4d	1295	3605
Conv. Coupe	1390	3545
Conv. Sedan	1700	3780
Eight-1702		
Tour. Sedan	1805	4100
Tour. Limo.	1955	4185
Super Eight-1703		
Club Coupe	1955	3860
Tour. Sedan, 4d	2035	3930
Conv. Coupe	2180	3970
Conv. Sedan	2435	4005
Super Eight-1705		
Tour. Sedan	2460	4425
Tour. Limo.	2600	4510
PACKARD (Cont.)		
Twelve-1707		
Coupe, 2-4p	4140	5400
Tour. Sedan, 4d	4155	5670
Coupe, 5p.	4185	5425
Club Sedan	4255	5590
Conv. Cpe., 2-4p.	4375	5540
Formal Sedan	4865	5745
Victoria	5230	5570
A-W Cabriolet	6730	4950
Twelve-1708		
Tr. Sed., 4d, 7p.	4485	5750
Tr. Limo., 4d, 7p	4690	5825
Conv. Sedan	5395	5890
A-W Town Car	6880	5075
Brunn Tr. Cab.	8355	5845
Brunn A-W Cab.	8355	5845
PLYMOUTH		
Roadking—P-7		
Coupe	645	2724
Sedan, 2d	685	2824
Tr. Sed., trk., 2d	699	2824
Sedan, 4d	726	2839
Tour. Sed., 4d.	740	2829
De Luxe—P-8		
Coupe	725	2789
Coupe, 2-4p.	755	2874
Sedan, 2d	761	2889
Tour. Sedan, 2d	775	2894
Sedan, 4d	791	2909
Tour. Sedan, 4d	805	2919
PONTIAC		
Quality Six		
Coupe	758	2880
Sport Coupe	809	2930
Tour. Sedan, 2d	820	2970
Tour. Sedan, 4d	866	2995
De Luxe Six		
Coupe	814	3000
Sport Coupe	865	3045
Tour. Sedan, 2d	871	3115
Tour. Sedan, 4d	922	3160
Conv. Coupe	993	
De Luxe Eight		
Coupe	862	3090
Sport Coupe	913	3135
Tour. Sedan, 2d	919	3200
Tour. Sedan, 4d	970	3255
Conv. Coupe	1046	
STUDEBAKER		
State Commander		
Bus. Coupe, 3p.	875	
Cust. Cpe., 3p.	900	3080
Club Sedan	955	3160
Cruising Sedan	965	3200
State President		
Custom Coupe	1035	3300
Club Sedan	1100	3390
Cruising Sedan	1110	3440
Conv. Sedan	1460	
WILLYS		
Standard		
Coupe	495	
Sedan, 2d	535	
Sedan, 4d	555	
De Luxe		
Coupe		
Sedan, 2d		
Sedan, 4d		
Custom Sedan		

PARTS NUMBERS AND PRICES

Buick—Series 40 Special—8 Cylinder—1939

Front Suspension

Mfr's Part No.	No. Per Car	List Price Each
1394255—Knuckle, L.	1	$7.50
1310017—Knuckle support, L.	1	5.00
1286029—King pin	2	1.00
231905—King pin bush	4	.15
148393—Pin thrust brg.	2	.50
230857—King pin lock pin	2	.15
1299316—Upper arm pin	2	.50
1298827—Upper pin bushing, R. F. & L. R.	2	.30
500863—Upper pin bushing, L. F. & R. R.	2	.35
1308341—Support arm low	4	3.50
231759—Low. arm pin	2	.60
231983—Low. arm pin bush	2	.50
1308448—Low. arm shaft	2	.75
1306519—Low. arm shaft bush.	4	.15
1310096—Main coil spring	2	5.00
1309204—Tie rod, L.	1	3.25
1309202—Tie rod, R.	1	2.50
1394531—End assem., L.	1	2.85
1303409—Knuckle arm, L.	1	1.75
1303945—Front wheel, prime.	2	9.50
1291516—F. hub & drum	2	10.25
1293548—Front brake drum	2	5.00
909702—Balls & separator, in.	2	.80
909542—Wheel brg. cone, in.	2	1.25
909602—Wheel brg. cup, in.	2	1.15
909501—Wheel brg. cone, out.	2	.65
909601—Wheel brg. cup, out.	2	.80
909701—Balls & separator, out.	2	.50
231713—Grease retainer	2	.20
1394331—Brake lining pri. set, 4 wheels	1	3.50
1394378—Brake lining sec. set, 4 wheels	1	3.75

Steering

265006—Pitman arm	1	2.25
263278—Cross shaft	1	6.50
263305—Cross shaft bush.	1	.30
263430—Gear housing	1	3.50
265027—Tube and worm	1	9.00
262200—Worm brg. cone	2	.85
263917—Worm brg. cup	2	.60
265025—Jacket tube	1	3.50
262159—Jacket tube. brg.	1	.70
1309563—Steering wheel	1	7.50
1309340—Steering wheel, Del.	1	16.00

Cooling

3111995—Rad. core assem.	1	36.00
1309726—Rad. shell, prime	1	24.00
1309077—Radiator grille, L.	1	10.00
3108581—Thermostat	1	1.00
1394581—Water pump body	1	3.00
1394578—Pump overhaul set.	1	4.75
1307692—Fan blades		....
1266943—Fan belt	1	1.30

Fuel and Exhaust Systems

491S—Carburetor assem.	1	30.00
170K-23S—Therm. coil & hsng.	1	2.00
1523703—Fuel pump	1	6.00
1523687—Fuel & vac. pump.	1	12.00
1306218—Inlet manifold	1	7.25
1307884—Exhaust manifold	1	8.00
1304457—Muffler	1	6.00
1308207—Tail pipe	1	1.95
1308639—Exhaust pipe	1	2.10

Engine Gaskets

1310760—Carb. to mani.	1	.75
1305418—Fuel pump	1	.03
1280450—Fuel & vac. pump.	1	.05
495390—Exh. pipe flange	1	.10
1399499—Manifold set	1	.50
1303962—Cylinder head	1	1.25
1394634—Cylinder head set.	1	3.00
1300926—Oil pan	1	.45
1235437—Main brg. seal, out.	2	.02
1305044—Main brg. seal, in.	2	.10
1266803—Timing case cover.	1	.18
1305044—Timing cover seal.	1	.10
1296224—Valve side plate	1	.30
1266796—Valve rocker cover.	1	.25
1271686—Water outlet	1	.05
1266927—Thermostat	1	.02
1285783—Water pump to block	1	.02
1266924—Water pump cover.	1	.03

Engine Parts

1394605—Block with pistons, pins and rings	1	125.00
1303699—Cylinder head	1	40.00

Engine Parts—continued

Mfr's Part No.	No. Per Car	List Price Each
1306078—Oil pan	1	$8.50
1308116—Crankshaft	1	70.00
1297903—Camshaft	1	20.00
1394444—Vibration damper	1	7.50
1307816—Flywheel	1	15.00
1309562—Flywheel gear	1	3.00
1394590—Piston & pin	8	4.60
1304895—Comp. ring (1/8)	8	.40
1299136—Comp. ring (3/32)	8	.40
1280657—Oil ring	16	.65
226100—Piston pin	8	.55
1240303—Pin clamp screw	8	.10
1394536—Connecting rod	8	3.85
1295704—Inlet valve	8	.75
1266751—Exhaust valve	8	1.25
1298890—Valve spring, inner.	16	.15
1298891—Valve spring, outer.	16	.20
1291216—Valve spring seat	16	.06
1291217—Valve key	32	.05
1285035—Valve guide	16	.40
1292993—Valve lifter	16	.85
1310174—Valve adj. screw	16	.15
124925—Adj. screw nut	16	.02
1310704—Valve push rod	16	.60
1303840—Rocker arm, front.	8	.35
1303841—Rocker arm, rear.	8	.35
1394372—Rocker arm shaft.	1	3.50
1266655—Timing chain	1	4.90
1266654—Crankshaft sprocket	1	1.75
1266653—Camshaft sprocket		2.00
MAIN BEARINGS		
1311004—Bearing set (reamed to size)	1	10.55

Engine Oiling

1288280—Oil pump body	1	4.00
1305539—Pump shaft & gear.	1	2.00
1305543—Pump idler gear.	1	1.00
1247328—Relief valve	1	.15
1290361—Relief valve spring.	1	.05

Clutch

1307796—Housing	1	11.00
1309876—Release bearing	1	2.50
1309436—Disk & facing	1	9.00
1308430—Press. plate	1	2.50
1308087—Press plate & cover	1	10.00
1306131—Diaphragm spring	1	2.50
1307804—Spring retainer	6	.05
1307885—Spline shaft	1	11.00
99004—Pilot bearing	1	...
47507—Spline shaft brg., R.	1	....

Transmission

1394663—Assembly	1	75.00
1310010—Case	1	11.50
1307848—Countershaft	1	1.00
1307794—CS. bushing	2	.15
1307852—CS. gear cluster	1	11.00
1307820—Mainshaft	1	6.00
1294780—Mnshft. pilot brg.	1	.35
7506—Mnshft. brg., R.	1	4.10
1307764—Low sliding gear	1	5.00
1307765—Second speed gear.	1	6.00
1307805—Second speed sleeve	1	4.00
1307851—Reverse idler gear.	1	4.80
1305659—Synch. drum	1	2.00
1309961—Cover	1	.50
1310707—Shift lever	1	1.25
1309311—Control shaft	1	2.00
1308604—Control rod	1	.50
1310744—Shaft lever, lower.	1	.85
1396980—Selector lever	1	.65
1308935—Selector cable	1	1.00
1307907—Selector shaft	1	.75
1310751—Selector shaft lever.	1	.70
1309653—Shift bar, low	1	.60
1309654—Shift bar, high	1	.60
1307864—Shift fork, low	1	.85
1307865—Shift fork, high	1	.85

Universals

1309468—Joint assem.	1	8.00
106803—Cross	1	1.25
106829—Cross bearing	4	.80
1310250—Flange yoke	1	2.50
1309230—Propeller shaft, F.	1	5.00
1308353—Propeller shaft, R.	1	6.00
178421—Rear shaft brg., F.	1	2.80
1308321—Bearing oil seal, F.	1	.40
1308322—Bearing oil seal, R.	1	.40

Rear Axle

1396908—Assembly	1	215.00
1308166—Housing	1	20.00
1309769—Cover	1	1.50
1309770—Cover gasket	1	.15
486399—Diff. carrier gasket.	1	.05

Rear Axle—continued

Mfr's Part No.	No. Per Car	List Price Each
1397083—Diff. & gear	1	$50.00
1302413—Differential case	1	7.50
968297—Differential pin	1	.75
1298941—Differential pinion	2	1.25
1302327—Diff. side gear	2	4.25
1394648—Pinion & ring gear.	1	22.50
370301—Ring gear rivet	12	.03
905606—Pinion bearing, F.	1	8.20
125630—Pinion bearing, R.	1	3.95
149520—Diff. bearing	2	3.70
1296810—Grease retainer, in.	2	.50
1296811—Grease ret., out.	2	.50
1396407—Axle shaft, L.	1	8.75
370240—Axle shaft, in. lock.	2	.05
111121—Rear brg. cone & race	2	3.65
111122—Rear brg. cup, in.	2	1.20
1293548—Rear brake drum	2	5.00
1309452—Torque tube, F.	1	4.00
1308387—Torque tube, R.	1	20.00
1308798—Radius rod	1	1.25
1309407—Radius rod bush.	2	.15

Rear Springs

1310363—Assembly (41c, 41, 48)	2	5.50
1310361—Assembly	2	5.50
1305014—Insulator, up.	2	.20
1394608—Spring clip, in., R.	1	.20
1394609—Spring clip, in., L.	1	.20

Electrical

1110801—Distributor assem.	1	10.00
1837494—Distributor cap	1	1.50
1871870—Contact set	1	.80
1836893—Rotor	1	.30
1869704—Condenser	1	.40
526B—Ignition coil	1	2.50
681H—Vacuum control	1	1.25
1994508—Lighting switch	1	....
1310185—Stop light switch	1	.60
1542—Solenoid switch	1	7.00
1990126—Vacuum switch	1	2.50
471T—Dimmer switch	1	.65
857868—Ammeter	1	1.80
1101052—Generator assembly	1	20.00
1857963—Gen. brush set	1	.40
1866789—Gen. arm. exch.	1	4.50
3203—Comm. end bearing	1	1.15
812823—Drive end bushing	1	.15
1869430—Gen. field coil set	1	1.50
5858—Voltage regulator	1	4.00
1107005—Starter assembly	1	22.50
811553—Starter brush	4	.10
1867897—Starter armature	1	....
812700—Field coil, L.	1	....
1873789—Starter clutch	1	3.50
670A—Headlamp assem., L.	1	....
923627—Headlamp body, L.	1	....
923427—Headlamp lens, L.	1	....
916974—Fender lamp, L.	1	3.25
481A—Rear lamp, L.	1	....
390B—License lamp	1	....
923561—Rear lamp lens	2	....
1304763—Bat. to switch cable	1	1.00
1304770—Bat. ground cable	1	.60

Body and Sheet Metal

(4-DOOR SEDANS) (IN PRIME)

1308895—Front fender, L.	1	17.50
1310223—With well, L.	1	21.00
1308089—Rear fender, L.	1	10.20
1309329—Hood top panel, L.	1	7.00
1309331—Hood side panel, L.	1	7.00
1309739—Rocker panel, L.	1	3.75
1309656—Panel molding, top.	4	.45
1309713—Panel mldg., L.	1	2.50
1396939—Running board, L.	1	10.50
1308811—Run. brd. brkt., F.	2	.60
1308667—Run. brd. mold., L.	1	1.00
1309190—Front bumper	1	16.50
1309191—F. bumper bar	1	12.00
1309054—Rear bumper	1	17.75
1309055—R. bumper bar	1	12.00

Miscellaneous

1308315—Hand brake cable	1	2.75
1310381—Hand brake lever	1	2.25
5450320—Master cylinder	1	5.50
5301079—Wheel cylinder, L.F.	1	2.75
5301083—Wheel cyl. cup, F.	4	.20
231333—Wheel cyl. cup, R.	4	.20
5450031—Wheel cyl. boot	8	.15
1308636—Brake hose, front	2	1.60
1309119—Frame (41c, 46c)	1	90.00
1308334—Frame	1	85.00
1948A—Shock absorber, F.	2	10.50
2103B—Shock absorber, L. R.	1	9.50

Truck Tune-Up Specifications

TRUCK MAKE AND MODEL	Engine Make and Model	Number of Cylinders Bore and Stroke	Connecting Rods Removed From	Intake Valve Opens °TC B—Before A—After	Intake Tappet Clearance for Valve Timing	Operating Tappet Clearance		Spark Plug Gap	Breaker Point Gap	Spark Occurs °TC A—After B—Before	Compression Pressure at Cranking Speed
						Intake	Exhaust				
AUTOCAR											
A, UA	Her JXB	6-3 5/16x4 1/4	Top	2°A	.010	.006	.006	.021	.020	TC	95
B, UB	Her JXC	6-3 3/8x4 1/4	Top	2°A	.010	.006	.006	.021	.020	TC	95
RM, RMT	Own 315	6-3 3/4x4 3/4	Top	TC	.020	.015	.018	.021	.021	8 1/2°B	98
D, DP, 1TR, 1UTR, RL, RLD, RLS, UD, UDP, 6X2RL, 6X2UD	Own 358	6-4x4 3/4	Top	TC	.020	.015	.018	.021	.021	8 1/2°B	98
DF, DH, N, NFS, 2TR, UDF, UN, UNFS, 2UTR, 4X4DF, 4X4N, 6X2DF, 6X4DF, 6X2UN	Own 404	6-4 1/4x4 3/4	Top	TC	.020	.015	.018	.021	.020	2°B	95
NF, CE, TS, 3TR, 4TR, S, UNF, UTS, 3UTR, 4UTR, US, 4X4NF, 6X2NF, 6X2UNF	Own 453	6-4 1/2x4 3/4	Top	TC	.020	.015	.018	.021	.020	2°B	95
T, 5TR, C, UT, 5UTR, 4X4S, 6X2T, 6X4TO, 6X4TD, 6X4TC, 6X2UT, 6X4UTO, 6X4UTD	Own 501	6-4 1/4x5 1/4	Top	TC	.020	.015	.018	.021	.020	2°B	95
BANTAM	Own	4-2.2x3	Top	19°B	.006	.006	.006	.025	.022	2°B	90
BROCKWAY											
94	Con 25B	6-3 7/16x4 3/4	Bot	5°B	.012	.008	.010	.025	.020	5°B	95
96, 110, 130	Con 29B	6-3 11/16x4 1/2	Bot	8°B	.015	.012	.012	.025	.020	8 1/2°B	90
125X, 145	Con 31B	6-3 7/8x4 1/2	Bot	8°B	.015	.012	.012	.025	.020	8 1/2°B	90
150X4, 150X5, 160X, 165X	Con 32B	6-4 1/16x4 1/2	Bot	8°B	.015	.012	.012	.025	.020	8 1/2°B	90
170X, 195X	Con 33B	6-4 1/16x4 3/4	Bot	5°B	.014	.012	.015	.025	.020	15°B	82
175X, 220X	Con 34B	6-4 3/16x4 3/4	Bot	5°B	.014	.012	.015	.025	.020	15°B	82
240X, 260X	Con 35B	6-4 1/2x5 1/4	Bot	5°B	.014	.012	.015	.025	.020	15°B	82
112, 128	Con 38B	6-3 5/8x4 3/8	Bot	8°B	.015	.012	.012	.025	.020	8 1/2°B	90
CHEVROLET											
HC, HD, HE, TA, TB	Own	6-3 1/2x3 3/4	Top	9°B	.....	.006	.013	.040	.018	5°B	.....
DIAMOND T											
80	Her QXB3	6-3 1/4x4 1/16	Top	5°A	.006	.006	.008	.027	.020	TC	*122
301, 304	Her QXC3	6-3 5/8x4 1/16	Top	5°A	.006	.006	.008	.027	.020	TC	*122
401, 402, 404, 405, 212-AS, 212-BS	Her JXA	6-3 5/16x4 1/4	Top	5°A	.006	.008	.010	.027	.020	TC	*120
221-S, 406, 507, 509, 244-S, 313, 611	Her JXB	6-3 5/8x4 1/4	Top	5°A	.006	.008	.010	.027	.020	TC	*121
320, 353, 607, 613	Her JXC	6-3 3/4x4 1/4	Top	5°A	.006	.008	.010	.027	.020	TC	*121
360, 609, 612, 614	Her JXD	6-4x4 1/4	Top	5°A	.006	.008	.010	.027	.020	TC	*115
412-DR, 512-B, 512-DR	Her WXLC3	6-4 1/4x4 3/4	Top	2°A	.010	.006	.010	.027	.020	TC	*103
DODGE											
RC, RD	Own 218 cu. in.	6-3 5/8x4 1/16	Top	TC	.014	.008	.012	.025	.020	TC	.....
RE	Own 218 cu. in.	6-3 5/8x4 1/16	Top	TC	.014	.008	.012	.025	.020	4°B	.....
RF	Own 228 cu. in.	6-3 7/8x4 1/16	Top	TC	.014	.008	.012	.025	.020	4°B	.....
RG, RH	Own 241 cu. in.	6-3 5/8x4 1/2	Top	TC	.014	.008	.012	.025	.020	6°B	.....
RL, RK, RO, RP	Own 333 cu. in.	6-3 3/4x5	Top	6°A	.011	.008	.012	.025	.020	6°B	.....
FEDERAL											
9	Con F4140	4-3 1/16x4 5/16	....	TC	....	.006	.008	.....	.020	TC	.....
10	Her OOB	4-3 5/16x4 1/16	Top	5°A	.008	.008	.012	.....	.020	TC	.....
11, 11H	Her QXB3	6-3 1/4x4 1/16	Top	....	....	.006	.008	.....	.020	TC	.....
15, 15H, 75, 75H	Her JXA	6-3 5/16x4 1/4	Top	5°A	.006	.008	.010	.025	.020	TC	.....
18, 18H, 20, 20H, 80, 80H	Her JXB	6-3 5/8x4 1/4	Top	5°A	.006	.008	.010	.025	.020	TC	.....
25, 25H, 85, 85H	Her JXC	6-3 3/4x4 1/4	Top	5°A	.006	.008	.010	.025	.020	TC	.....
29, 29H, 89, 89H	Her JXD	6-4x4 1/4	Top	5°A	.....	.008	.010	.....	.020	TC	.....
40, 40DR	Wau 6MK	6-4 1/16x4 3/4	....	8°A	.004	.010	.012	.025	.020	TC	80
50, 50H	Wau 6MZ	6-4 1/4x4 3/4	....	8°A	.004	.010	.012	.025	.020	TC	80
C7, C7W, C8, C8W, C8H	Wau 6SRK	6-4 5/8x5 1/8	....	10°A	.004	.010	.012	.025	.020	TC	80
FORD											
81C, 81Y, 81T, 817T	Own	8-3 1/16x3 3/8	Top	TC	.013	.013C	.013C	.025	.015	4°B	100
92C, 82Y	Own	8-2.6x3.2	Top	9 1/2°B	.013	.013C	.013C	.025	.015	4°B	105
GENERAL MOTORS											
T14, T15, T145, T155	Own 223	6-3 7/16x4	Top	5°B	.013	.012	.012	.030	.021	5°B	.....
T16, T16H, F16, F16H	Own 230	6-3 7/16x4 1/16	Top	5°B	.008	.008	.011	.030	.021	TC	.....
T18, T18H, F18, F18H	Own 239	6-3 7/16x4 5/16	Top	4°B	.012	.013	.013	.035	.021	15°B	.....
T23, T23H, F23, F23H	Own 257	6-3 7/16x4 5/16	Top	4°B	.012	.013	.013	.035	.021	15°B	.....
T33, T33H, F33, F33H	Own 286	6-3 5/8x4 5/16	Top	4°B	.012	.013	.013	.035	.021	15.B	.....
T46, F46	Own 331	6-3 3/4x5	Bot	18°A	.012	.013	.013	.035	.020	15°B	.....
T61, T61H, F61, F61H	Own 400	6-4 1/4x5	Top	18°A	.012	.013	.013	.035	.020	15°B	.....
HUDSON-TERRAPLANE											
80, 88	Own	6-3x5	Top	11°B	.010	.006	.008	.032	.020	TC	103

TRUCK MAKE AND MODEL	Engine Make and Model	Number of Cylinders Bore and Stroke	Connecting Rods Removed From	Intake Valve Opens °TC B—Before A—After	Intake Tappet Clearance for Valve Timing	Operating Tappet Clearance		Spark Plug Gap	Breaker Point Gap	Spark Occurs °TC A—After B—Before	Compression Pressure at Cranking Speed
						Intake	Exhaust				
INTERNATIONAL											
D2, D15	Own HD213	6-3 1/16x4 1/8	Top	TC	.010	.010	.010	.023	.021	6°B	93
D5	Wau FC132	4-3 1/4x4	Top	.....	.010	.010	.010	.023	.021	.....	.....
D30, DS30, D30B, DS30B, D300, DS300, D186T, DS186T	Own HD232	6-3 1/16x4 1/2	Top	TC	.010	.010	.010	.023	.021	6°B	93
D35, DS35, D35B, D216T	Own FAB241	6-3 5/16x4 1/2	Top	.....	.....	.015	.015	.023	.021	.....	94
D40	Own FAB259	6-3 1/2x4 1/2	Top	.....	.....	.015	.015	.023	.021	.....	99
D50, D246T, D246F	Own FBB298	6-3 3/4x4 1/2	Top	.....	.....	.015	.015	.023	.021	.....	92
D60, DR60	Own FBB361	6-4 1/16x4 1/2	Top	.....	.....	.015	.015	.023	.021	.....	89
DR70, DR346T, D346F	Own FBB401	6-4 1/16x5	Top	.....	.....	.015	.015	.023	.021	.....	92
DR426F	Own FBB450	6-4 5/16x5	Top	.....	.....	.015	.015	.023	.021	.....	89
AR626F	Own FEB648	6-5x5 1/4	Top	.....	.....	.011	.013	.023	.021	.....	68
MACK, JR.											
2M4A	Own MR140	4-3 7/16x4 3/16	Top	TC	.012	.007	.010	.025	.020	6°B	90
2M6A, 2M6AS, 10MF, 11M	Own MR209	6-3 7/16x4 3/16	Top	2°B	.012	.007	.010	.025	.020	2°B	90
21M, 21MT	Own MR228	6-3 5/16x4 1/4	Bot	5°B	.012	.007	.008	.025	.020	8 1/2°B	80
31M, 31MDR, 31MT	Own MR268	6-3 3/8x5	Bot	TC	.012	.007	.008	.025	.020	8 1/2°B	80
MACK											
EE	Own FO	6-3 1/2x4 3/16	Top	6 1/2°B	.017	.017	.017	.025	.020	3°B	105
EF	Own FM	6-3 5/8x4 3/16	Top	6 1/2°B	.017	.017	.017	.025	.020	3°B	105
EJ	Own EJ	6-3 1/2x5	Bot	TC	.012	.008	.010	.025	.020	.....	.....
EH, ER, EM, EC	Own BG	6-3 5/8x5	Top	6°A	.012	.008	.024	.025	.020	7°B	89
BF, EQ, EB	Own CU	6-3 7/8x5	Top	6°A	.012	.008	.024	.025	.020	7°B	90
BM, CH	Own CE	6-4x5 1/2	Bot	10°A	.012	.008	.024	.025	.020	7°B	91
BX, FH, CJ	Own CF	6-4 1/4x5 1/2	Top	10°A	.012	.008	.024	.025	.020	7°B	91
BQ, AK, AC6	Own BQ	6-4 3/4x5 3/4	Top	10°A	.012	.008	.024	.021	.020	2°B	84
AC4	Own AC	4-5x6	Top	10°A	.012	.008	.024	.021	.020	TC	65
PLYMOUTH											
PT57	Own	6-3 1/8x4 3/16	Bot	6°A	.014	.006	.010	.025	.020	4°A	*145
REO											
450, 450L, 475, 475L	Own S140	4-3 7/16x4 3/16	Top	2°B	.....	.008	.012	.025	.020	6°B	.....
650, 650L, 675, 675L, 1A4, 1C4	Own S209	6-3 7/16x4 3/16	Top	TC	.....	.008	.012	.025	.020	2°B	.....
1L5	Own S209	6-3 7/16x4 3/16	Top	TC	.....	.007	.008	.025	.020	2°B	.....
1A4H, 1C4H, 1B4, 1D4, 1B7M	Own S228	6-3 5/8x4 1/4	Top	5°B	.....	.007	.008	.025	.020	8°B	.....
1B4H, 1D4H	Own S3L	6-3 5/8x5	Top	18°A	.....	.007	.008	.025	.020	6°B	.....
2B7M	Own	6-3 5/8x5	Top	5°B	.....	.007	.008	.025	.020	8°B	.....
2B4, 2D4, 2J5, 2H5, 2L7M, 31RHA-B	Own S3	6-3 5/8x5	Top	TC	.....	.007	.008	.025	.020	8°B	.....
2L4	Own S3	6-3 5/8x5	Top	TC	.....	.008	.012	.025	.020	8°B	.....
2L4H, 2L7MH, 3H5, 3J5, 3K5, 3HR5, 3JR5, 3KR5	Own S5	6-3 5/8x5	Top	TC	.....	.007	.008	.025	.020	8°B	.....
4H5, 4J5, 4K5, 3L6 H, 4WH5	Buda K428	6-4 5/8x4 3/4	Bot	TC	.....	.006	.006	.025	.020	10°B	.....
STEWART											
40A, 40AH	Con F4162	4-3 7/16x4 5/16	Top	.....	.010	.010	.014	.030	.025	TC	.....
60A	Con 6170	6-3x4	Top	.....	.010	.010	.014	.025	.025	.....	.....
61A	Con F6218	6-3 1/4x4 5/16	Top	.....	.012	.012	.014	.025	.025	.....	.....
45A, 45AS	Wau ZKA	6-3 5/8x4 1/16	Top	8°A	.010	.010	.012	.025	.025	.....	.....
47A, 50A, 50AS, 50AD	Wau BM	6-3 5/8x4 1/4	Top	TC	.010	.010	.012	.032	.025	.....	.....
49A, 49AD	Wau BK	6-3 3/4x4 1/4	Top	TC	.010	.010	.014	.032	.025	.....	.....
51A, 51AD	Con E602	6-4 1/16x4 1/2	Top	TC	.017	.017	.017	.025	.025	TC	.....
58A, 58AD	Wau MZ	6-4 1/4x4 3/4	Top	8°A	.010	.010	.010	.025	.025	.....	.....
38-6, 31X	Wau SRK	6-4 5/8x5 1/8	Top	10°A	.010	.010	.014	.025	.025	.....	.....
COE-1	Wau	6-3 1/2x4 1/16	....	.....	.....	.....	.....	.....	.....	.....	.....
COE-2, COE-3	Wau	6-3 5/8x4 1/4	....	.....	.....	.....	.....	.....	.....	.....	.....
COE-4	Wau	6-3 3/4x4 1/4	....	.....	.....	.....	.....	.....	.....	.....	.....
STUDEBAKER											
K5	Own T	6-3 7/16x4 3/16	Top	15°B	.020	.016C	.016C	.025	.020	2°B	95
K10	Own OT	6-3 7/16x4 3/16	Top	2 1/2°B	.020	.016C	.016C	.025	.020	2°B	95
K15, K15M, K15B	Own IT	6-3 7/16x4 3/16	Top	15°B	.020	.016C	.016C	.025	.020	2°B	95
K20, K20M, K20MB	Her JXB	6-3 5/8x4 1/4	Top	2°A	.010	.008H	.010H	.025	.020	TC	95
K25, K25M, K25MB	Her JXD	6-4x4 1/4	Top	5°A	.010	.008H	.010H	.025	.020	TC	95
K30, K30M	Her WXC3	6-4 1/4x4 1/2	Top	2°A	.010	.006H	.010H	.025	.020	TC	90
WILLYS											
38	Own 38	4-3 1/16x4 5/16	Top	TC	.010	.004	.006	.025	.020	5°A	87

ABBREVIATIONS: *—At 1000 RPM **Bot**—Bottom **C**—Cold **Con**—Continental **H**—Hot **Her**—Hercules **Wau**—Waukesha

Fords Capture South American Race Classic

Ford V-8s captured the first five places in the 1938 renewal of the Argentine Grand Prize Race to add still another victory to the series which cars of this make have scored in South America's road racing classic.

The winning driver was Ricardo Risatti whose time for the rugged 4,565 mile route was 88 hours 59 minutes, an average of 51.3 m.p.h. The race, run in 10 stages, led through 14 Argentine provinces and extended from the Atlantic seacoast to the Bolivian border and up into the Andes. So severe were road and weather conditions that only 22 of the 123 starters were able to finish.

Bad weather and a longer route combined to make Risatti's winning time slightly slower than that of Angel Lo Valvo, 30-year-old grain dealer, who drove a Ford V-8 to victory in last year's race. Lo Valvo averaged 53.13 miles an hour for the 4279-mile route covered by the 1937 contestants.

C.S.R.A.-A.A.A. 1939 Agreement Indefinite

Whether the American Automobile Association and the Central States Racing Association would renew their agreement for cooperative sanctioning of speed events in 1939 was not determined by the bodies as MOTOR AGE went to press.

While Norman Witte, secretary of the CSRA said his group had approved continuation of the agreement made with the AAA last summer, the Automobile Association's Contest Board had not yet replied to the CSRA offer.

What the AAA stand would be when the agreement terminated Dec. 31 was being debated by the speed fraternity.

Under the agreement in force in the latter months of the 1938 speed campaign, the two associations interchanged drivers. Events sanctioned by the AAA were also open to drivers of the CSRA and the same courtesy was allowed AAA registered drivers and car owners in CSRA sanctioned events. The 1938 agreement came too late for the CSRA drivers to be eligible for the Indianapolis classic run on Memorial Day.

The CSRA approval of an agreement for 1939 came at the association's semi-annual meeting Dec. 2 at Dayton, Ohio. The group named as its president, Dr. J. K. Bailey, of Dayton, to replace Foster Shultz, of Greenville, Ohio, who was elected to the board of directors. Named vice-president was Henry Miller, of Pittsburgh, Pa.; treasurer, Irvin Snyder, of Dayton, and secretary, Norman Witte, Dayton.

The 1939 board of directors includes Frank Funk, Winchester, Ind.; John Vance, Everett Saylor and Melvin Moore, of Dayton, and Clay Corbitt, of Columbus, Ohio. Bob Martindale was retained as the group's Contest Board chairman.

The association restricted engine displacements according to "A" and "B" classification. "A" class events will be open to all types of motors with a peak maximum of 366 cu. in. "B" class races will be open only to cars with not more than 214 cu. in. displacement. The restrictions will go into effect on April 15.

The CSRA will complete plans for its 1939 season at a meeting Jan. 27 in the Speedway room of the Hotel Gibbons at Dayton.

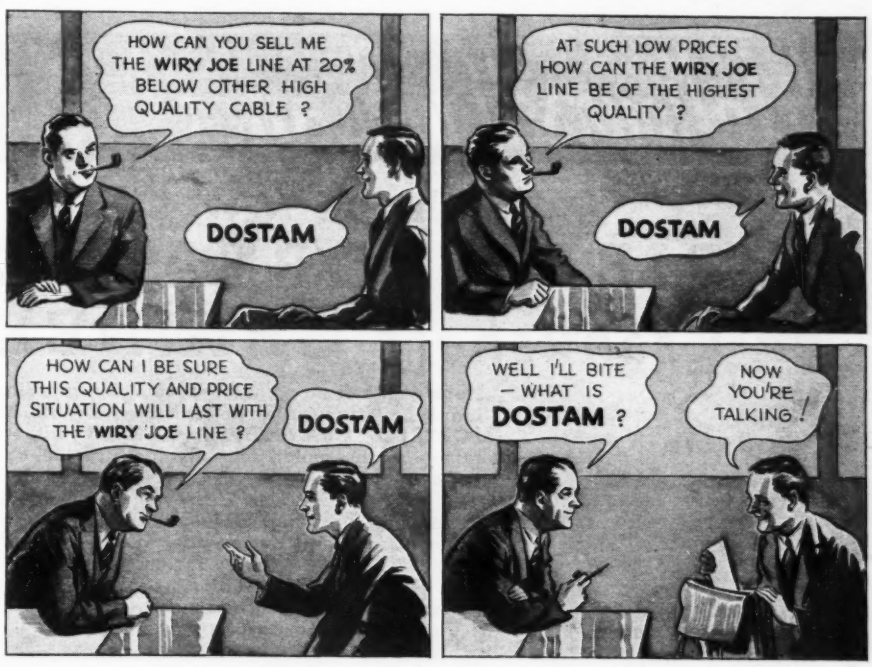
Acheson Appointments

R. Szymanowitz, technical director, Acheson Industries, Inc., has announced the appointment of James H. Gamberton, mechanical engineer, to his technical staff. Mr. Gamberton will supervise engineering tests involving new applications of the "dag" products of the company's affiliate, Acheson Colloids Corp.

At the same time, M. W. Reynolds, sales manager, Acheson Colloids Corp., has announced that Eugene F. Heer, formerly associated with duPont, U. S. Rubber, and Truscon Laboratories, has been placed in charge of sales research activities at Port Huron, succeeding J. H. Fulmer, resigned. A major part of his time will be devoted to developing new uses for "dag" colloidal graphite.

E. R. Hayes, formerly connected with the Bay State Abrasives Co., has been added to the sales staff to represent the company in sales development work in the State of Michigan. Headquarters offices for Mr. Hayes will be at 250 E. Grand Blvd., Detroit.

Denham and Co., Detroit, has been retained to handle publicity for Acheson Colloids Corp., according to an announcement by E. A. Bodine, advertising manager.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(*Continued from page* 15)

each side of the frame. One of these is a dummy, although appearing in every way normal, with terminal and cables. The lid of the fake battery is hinged, and the inside lined with plush, forming an ideal jewel compartment.

Unusual paint jobs are occasionally necessary for other reasons than personal taste. An Indian Maharajah called one day to give the final approval of a streamlined job being built for him.

"Oh yes. I forgot to tell you. I want it painted yellow and black," he said, offering a sample of a particularly brilliant yellow made famous by an American taxi company.

It was like telling an architect who has turned out the finest house of his entire career—"Now paint it purple and red."

There were a few moments of embarrassed suggestions, but the Maharajah was determined.

"Yellow and black."

"But—"

"You see, gentlemen, in my country every man of standing has his own traditional colors. No one else may use those colors but the man to whom they are given—and he must always use them. Yellow and black happen to be my colors. All my fifty-two cars are painted in this same combination."

Another slightly delicate situation came up in building a car for a Japanese nobleman. The drawings shown him were greeted with: "Lovely, lovely! But— Have you ever been in Tokio?"

"No."

"Of course. I should have explained. You see, the car must be just half the size of this model. Just half. Even in Tokio one must turn corners, but the streets in Tokio are narrow—so narrow—"

Another item—required by Tokio traffic laws—was a set of fabric flaps which hung from the fenders almost to the ground, covering the wheels and preventing splashing. When a Japanese is dressed up, he doesn't intend to have a careless motorist give him a mud bath. A special switch was also necessary on the tail light. Japanese law forbids a tail light switch inside the car. You must get out of the car to turn off the tail light. This prevents a driver escaping the guardians of law and order by turning off his lights on a dark night.

One of the most unusual orders received by this company was from a young woman who walked briskly into the office.

"I want a well equipped car," she opened her purse and brought out a list, checking as she went along. "It must have an additional generator so that I can make toast and coffee and cook a few things. I want a hidden safe, a water tank to hold a couple weeks' supply, sanitary arrangements, and I want to be able to lock myself in. I also want to be able, though locked in, to shoot out of the car. I'll need a compartment to conceal weapons and ammunition.

"But—but what are you going to do with it?"

"I'm going into the backwoods of China. I've been there before. There are few roads and plenty of bandits. I must be able to protect myself, as well as be able to live in the car until help comes."

A peculiar order came from the Hal Roach studios in connection with the filming of the motion picture, "Topper." After a design for an ultra streamlined car with a rudder was decided upon, one of the studio executives said, "Of course, you know it's going to be driven by a ghost. Please make due arrangements in the construction."

"Ghost? Oh, for the ghost. Yes. Well—how much room does a ghost need?"

When the psychic haze was cleared away, it turned out that the script called for the car to apparently drive itself. This meant that arrangements had to be made to conceal the driver. The original design was for a roadster without doors. After a long debate with studio officials, it was decided to install doors, and place an extra steering wheel and gear shift on the floor. A stunt man coiled up out of sight and drove the car through traffic. The motor was so arranged that he had a clear view through the radiator.

One of the most advanced streamlined jobs ever turned out by this company was the Phantom Corsair designed by Rust Heinz, views of which have already appeared in Motor Age. This car, lined with sponge rubber, and having individually sprung wheels, front wheel drive, and electric

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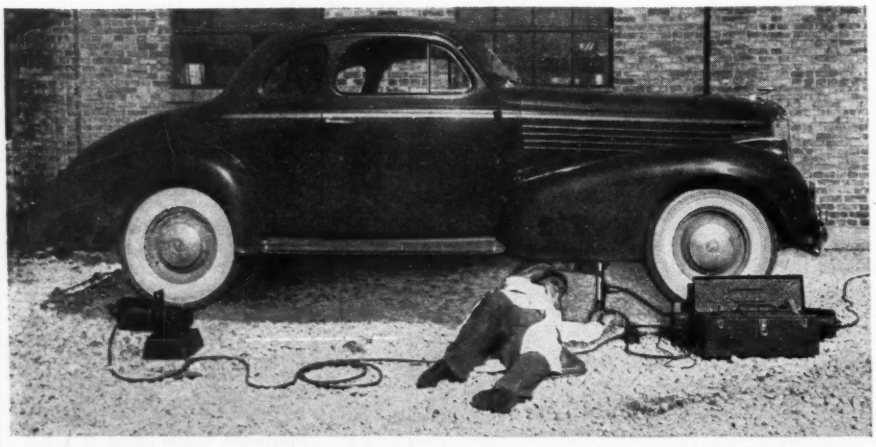


gear shift, is so completely streamlined that it can attain a speed of 122 m.p.h. with a relatively small motor.

And so they come to the special body builder—with gadgets, pet ideas, screw-loose inventions. Sometimes they want concealed bars with glasses and cocktail shaker locked in place, sometimes it's an instrument panel that looks like the main switchboard at Radio City Music Hall, or maybe they just want gold or silver door handles and fittings.

But some of the inventions stick, and are carried over into the design of standard models. The now familiar "pants" on the rear wheels were worked out in this way. A streamlined metal tire cover for tires carried in front fender wells, which was part of a recently built special body, will be standard equipment on one make of car next year.

Much of the experimental work in streamlining is done in the special body shops. They are a testing ground for body design, just as the race track is for motors. For not every man with an idea is screw-loose. And in the end it is you and I who drive standard cars who gain by it all.

Automotive Training School

Prominent individuals in the automotive industry attended recently the dedication exercises of the new $3,000,000 Brooklyn High School of Automotive Trades. Alfred Reeves, vice-president of the Automobile Manufacturers Association and featured speaker at the ceremonies, commented that "Complete courses of training for mechanics are maintained by the factories, but they cannot begin to supply the demand for young men with a trained understanding of automobiles to work in repair shops, garages, filling stations as well as automobile dealerships. For that reason schools in all the larger cities are doing splendid work in providing educational facilities for the driving, care and repair of automobiles."

This latest addition to New York City's educational system has a frontage of 400 ft., a depth of 250 ft. and is four stories high. There are approximately 10 acres of floor space. The general construction cost $1,100,000, the equipment of cars and machinery over $500,000, and including the site the total outlay by the city amounted to nearly $3,000,000.

The building has 26 shops, an equal number of class rooms and the most modern appointments for an educational institution of its type, being one of the very few vocational schools in the country exclusively devoted to instruction in the automotive trades. Courses are open to boys from 14 to 20 years old who have graduated from the elementary schools.

Mr. Reeves declared that the new building was "one of the finest recognitions that the automobile industry has had in many years."

K-D Announces Turn Signal

The K-D Lamp Co., 610 W. Court St., Cincinnati, Ohio, has developed a direction indicating signal for passenger cars known as the K-D Signacator. It consists of four lights with amber arrows, two for the front and two for the rear. They are operated by a switch on the steering column, and automatically turn off as soon as the turn is made. If the driver gives the signal incorrectly it automatically corrects itself as the turn is made. Another feature is the Slow-Light on the rear signals which indicate that the driver is slowing down.

Lamps are supplied in black enamel or chrome, and can be obtained in prime so they can be finished to match the color of the car. For complete details write the manufacturer.

Carnu Auto Finish Restorer

The latest product to be announced by S. C. Johnson & Son, Inc., Racine, Wis., makers of Johnson's Auto Wax and Auto Cleaner, is "Carnu," said to be a new kind of auto finish restorer which cleans and polishes in one application. Cars, the finish of which is of average dirtiness, can be cleaned and shined in from one to two hours, according to the manufacturer.

Announcing
THE NEW 1939 LINE
PAR AIR COMPRESSORS

New models . . . New assemblies . . . New tank design . . . New motor adjustment . . . New and higher efficiency . . . New and lower prices.

PUT IT UP TO PAR!

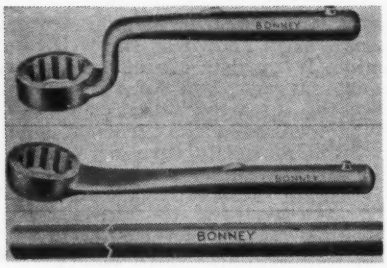
Rely on PAR to solve your air service problems . . . The high efficiency of the PAR model best suited to your needs can be taken for granted—day after day—month after month . . . Send for information on how you can put your service up to PAR—at low first cost and with low upkeep.

- Low average daily costs in heavy service.
- Moderate prices—long, trouble-free performance.
- Compact design saves floor space.
- Horizontal and vertical outfits.
- Seventeen models, from ½ to 10 H.P.

MODERN EQUIPMENT CORP., DEFIANCE, OHIO

Heavy Duty Box Wrenches

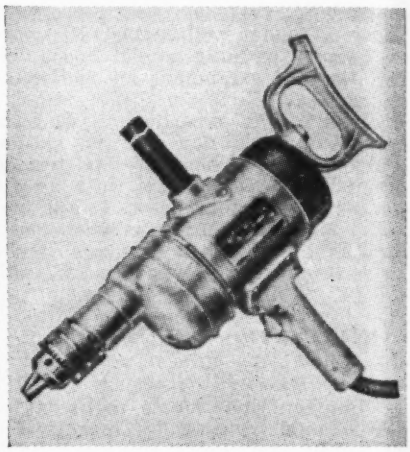
Bonney Forge & Tool Works, Allentown, Pa., has just announced the addition of a new line of heavy-duty box wrenches with interchangeable tubular handles. Made in both double-offset and 15 degree angle type, they are drop-forged of chrome-alloy steel, carefully heat treated and heavily plated, with polished heads. Each type is made in seven sizes with double hexagon openings ranging from 1⅝ in. to 2¼ in. Designed especially for work on trucks, buses, tractors, steam shovels, road and industrial machinery.



One size of interchangeable tubular handle made of seamless steel tubing is all that is necessary for use with the 14 wrenches in the heavy-duty box wrench line. The handle is 30 in. long. Holes are provided in each end of the handle to insure positive locking on the "spring-ball" plunger in the end of the wrench shank.

New Stanley "Victor" Electric Drills

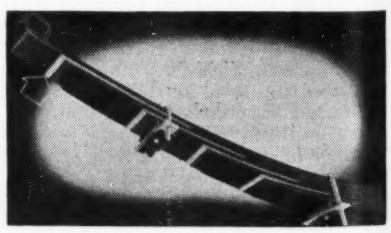
Two new "Victor" portable electric drills, Nos. 581 and 341, designed for use by contractors, automotive mechanics, plumbers, heating and ventilating contractors and maintenance men, are announced by Stanley Electric Tool Division, New Britain, Conn. These drills are said to be sturdy, compact, low priced, and equipped



with reserve power universal motors. No. 581 has a chuck capacity of ⅝ in. and No. 341 has chuck capacity of ¾ in. Both drills have nickel steel gears, specially heat treated, are full ball bearing, have combination breast plate and spade handle, and pipe handle which is detachable for close quarter work.

Lubri-Flex Spring Silencer

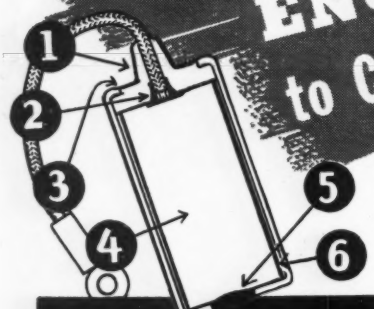
Eaton Products, Inc., 739 E. 140th St., Cleveland, Ohio, has announced a new product known as Lubri-Flex Spring Silencer. It is made of a long-wearing fibrous material impregnated with a special lubricant which is said to provide permanent lubrication under the ends of the longer spring



leaves. Metal end guards protect the ends from weathering and from road gravel. Rubber button inserts are provided to hold the Silencers in alignment. The Silencers are inserted between the leaves of the spring. The regular spring rebound clips are discarded, and are replaced with rubber insulated, self-locking rebound clips which are furnished to take care of the additional thickness caused by the Silencers. Only 8 kits are required for practically all cars. For complete information and prices, write Eaton Products, Inc.

A NEW Sales Logic!

"GUARANTEED" Ignition Parts ENGINEERED to Compensate for Wear!



HERE'S THE DIFFERENCE:

This is the new "Guaranteed" Condenser, "engineered to compensate for wear!" Note these *plus value* features:

1—Bakelite top completely insulates the pig tail wire from can even if wire insulation wears.

2—Metal insert is swedged into top to keep moisture out.

3—Special preparation seals entire assembly against moisture.

4—Non-inductive type filler for quick action, long service.

5—Full soldered type for sure connection.

6—Impregnated tube for added insulation.

YES... it's absolutely logical! Ignition service parts should compensate for the wear in all working parts of distributors and motors. *Ordinary parts don't fill the bill!*

That's why "Guaranteed" has taken the lead in improving ignition replacements. "Guaranteed" Parts are now built with EXTRA POWER and EXTRA STAMINA. The *only* line that's *"engineered to compensate for wear!"*

But that isn't all. A forceful sales campaign takes this great news direct to the car owners. Sells *them* the idea! Pulls *them* into the shop!

With a brand new line-up of vigorous sales helps . . . plenty of new streamers, signs, wall charts, decalcomanias, bulletins, fast-selling merchandisers . . . "Guaranteed" turns mechanic into merchant. Makes ignition the profitable end of his business.

It will be your BEST ignition year —*if you act now!* Write today for the new "GUARANTEED" Sales Plan!

GUARANTEED PARTS CO., Inc. 250 W. 54 St., N. Y. C.

"IGNITION REPAIR PARTS OF REPUTE"

A New CARTER Service that insures better work

Repair Parts Packages

for the most Popular Carter Carbureters

THIS new Carter service to the maintenance industry saves you time and improves your work. Each Carter Repair Parts Package contains necessary parts to restore original performance and mileage to carbureters that have served well for thousands of miles.

This quick-service plan makes ordering of parts easy—saves "pencil work." And because the package contains just essential parts it assures a more satisfactory job.

In addition there's a saving in the cost of parts through this method of merchandising.

Ask your Carter jobber or distributor for the new Repair Parts Package—see for yourself how it speeds up service—or write for catalog page and price list giving full details.

An attractive Glass Front Illuminated Display Case with mirrored back and sides is supplied—no charge—with order for 15 Repair Parts Packages.

Division of American Car and Foundry Company

CARBURETER
PRODUCTS OF PRECISION

CARTER CARBURETOR CORPORATION

2820-56 North Spring Avenue, St. Louis, Missouri

The Labor Union and the Garage

The repair shop operator has little defense againt picketing

An Illinois garage owner employed a number of mechanics. A union representative solicited the men to join the union. The men refused because, as they pointed out, their working conditions were more satisfactory to them than the conditions under which union employees worked.

The union then picketed the garage and placed in front of it signs reading, "This garage is unfair to organized labor."

The garage owner obtained an injunction restraining further picketing on the part of the union. On appeal by the union, however, the appellate court of Illinois set aside the injunction against picketing, and thus permitted the union to picket the place under the circumstances.

"While this garage owner complains about presence of the pickets that alternated in front of his place of business," said the court, "his real complaint unquestionably is against the publicity given by the signs carried by them proclaiming the truth as to the unfairness of his attitude toward organized labor. He persists in his refusal to deal with a labor union, and yet he resents as an infringent of his rights the disclosure by that union to the public, including members of labor unions and their sympathizers, of his antagonism toward organized labor. His position that, notwithstanding his antagonism toward the union, the law must silence the voice of organized labor lest he may suffer any ill consequence as a result of their attitude is not tenable. It is, of course, his right and privilege to refuse to deal with the union and to operate a non-union shop, but in our opinion it is just as much the right and privilege of the union, when he so refuses, to publish the fact that it regards him as unfair to it."

The curious feature in this case is the fact that the employees themselves, when solicited, refused to join the union because their working conditions were more satisfactory to them than union working conditions.

EDISON-SPLITDORF CORPORATION

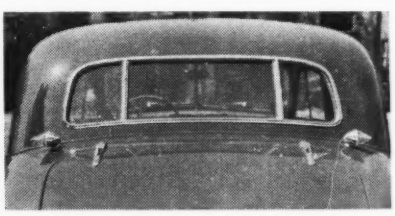
WEST ORANGE NEW JERSEY

Edison Spark Plugs

ONE OF THE Thomas A. Edison INDUSTRIES

Unity Turn Signals

Differing from the conventional direction signal which employs a direction indicating arrow, the Unity Turn Signals recently announced by the Unity Mfg. Co., 2909 Indiana Ave., Chicago, Ill., are made in the form of a prism glass pointer, indicating direction. Using amber glass with an inside reflector, the light body is chrome plated to add style and beauty



to the passenger car. Lights are sold in pairs, and are for either front or rear installation, or both. A new turn signal switch for mounting on the steering column in such a manner that it will not interfere with the remote control gear shift lever is supplied in the unit package. Unity Turn Signals are designed for passenger car and truck installation. List price of package containing switch and two rear Turn Signals, $8.00; $8.25 west of Denver.

Ten Month Retail Sales

Retail sales of automobiles in the United States for the first ten months of 1938, according to figures released by the Automobile Manufacturers Association, numbered, with trucks, 1,794,083. Other monthly figures for 1938 and for 1937 were as follows:

1938	Cars	Trucks	Total
July	153,426	36,470	189,896
August ...	123,711	33,822	157,533
September	90,629	25,710	116,339
October ...	134,668	17,283	151,951
1st 10 Mos.	1,474,402	319,681	1,794,083
1937			
1st 6 Mos..	2,036,347	372,203	2,408,550
July	347,120	60,925	408,045
August ...	310,312	63,353	373,665
September .	192,967	53,303	246,270
October ...	212,651	31,510	244,161
1st 10 Mos.	3,099,397	581,294	3,680,691
November .	212,389	28,721	241,110
December .	171,643	33,480	205,123
Year 1937 .	3,483,429	643,495	4,126,924

American Drivers Still "Tops" in Speed

A review of the automobile speed records that stand on the official books as they close for the 1938 season reveals that American engineering and the skill of American speed drivers still maintain the supremacy they have enjoyed ever since America gave the world its first automobile. Of all official automobile records now listed, 89 per cent of them are credited to Americans. The meager balance of 11 per cent is shared by the drivers of Europe and the rest of the world.

In comparison with the 51 recognized records that are now held by all foreign drivers combined, American drivers hold a total of 421 records in the bracket ranging from the shorter distances up to the 48-hour mark. Firestone Tire and Rubber Co. proudly announces that every world and every international record established by an American driver has been made on Firestone tires. Firestone tires are credited with more speed records than all other makes of tires combined.

As the most prolific automobile speed record breaker of all time, Ab Jenkins, the Utahan, stands unchallenged. During his career, he has broken and re-broken more than 1,000 speed and endurance marks. Today, he holds more records than any driver in the history of the sport.

Buda Announces Ford Diesel

The Buda Co. has announced one of its standard production Diesel models for installation in Ford truck chassis.

The engine used is a four cycle, four cylinder, solid injection Buda-Lanova Diesel, with 3⅝ in. bore by 5⅛ in. stroke, having a 212 cu. in. displacement. The company also announces the completion of two new Buda-Lanova automotive Diesel models for the Mack Manufacturing Co.

These new models will be two of the seven models of Buda-Lanova Diesels on which Mack has standardized for their Diesel requirements.

New Models Hypressure Jenny

The Homestead Valve Mfg. Co., Coraopolis, Pa., has anounced new models of Hypressure Jenny, ranging from Model "K" at a net price of $315.00 to Model "EH" at $730.00. Other models include Model "KG", and Model "J". These are portable units with the exception of Model "K", and contain several improvements over previous models, according to the manufacturer.

NAPA Meeting

The National Automotive Parts Association and its manufacturing associates held their annual meeting at the Knickerbocker Hotel in Chicago Dec. 12 and 13. Henry Lansdale, vice-president and general manager, reported a year of continued progress, with total sales volume on NAPA lines running in excess of 1937, on the basis of the first eleven months.

The officers of the association for the past year were re-elected, and two new members were added to the board of the directors. A. F. Baxter, Unit Parts Corporation, Buffalo, was elected president; Carlyle Fraser, Genuine Parts Company, Atlanta, vice-president; Henry Lansdale, Detroit, vice-president and general manager.

Century Race for Cleveland

Cleveland, Ohio, was assured of "at least" one 100-mile automobile race for 1939 in announcement of Norman Witte, secretary of the Central States Racing Association at Dayton.

While not revealing the identity of the operators of the proposed events or designating the site, Witte said the CSRA has granted a 1939 license for a schedule at Cleveland which might include three such classics. He said official announcement would not be made until February when the season's schedule of CSRA events is due.

Witte said the backers of the Cleveland speed program are well known in the sports world for professional football, running races and other sports events in the Ohio city.

A 100-mile race scheduled there for last Labor Day was cancelled because of the National Air Races.

"HERE'S THE CABLE THAT *keeps its jacket on*

...no matter how hot and oily it gets!
...Gives you fatter sparks, better engine performance for a longer time... the jacket is made of long-lasting NEOPRENE"

HERE'S a new way to prevent power loss from ignition leaks . . . a new way to help keep engines performing their best longer than ever before. Simply install ignition cable jacketed with Du Pont *neoprene*.

Neoprene stands up under engine heat, oil, grease, and corona . . . resists cracking and checking, protects the rubber insulation, keeps power inside the cable where it belongs . . . long after ordinary cable jackets wear out. That's why you'll find neoprene-jacketed ignition cable equipment on many of America's finest cars, trucks, and buses . . . one of the more than forty neoprene auto parts now being used by leading manufacturers.

Take this first step right now toward providing trouble-free ignition. Ask your supplier for complete information about neoprene-jacketed cable.

Ask your supplier for

NEOPRENE

JACKETED WIRE

• • •

OR WRITE US FOR A LIST OF MANUFACTURERS

DU PONT

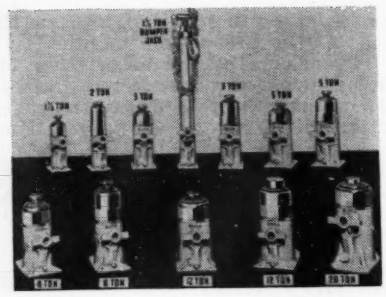
E. I. DU PONT DE NEMOURS & COMPANY, INC.

RUBBER CHEMICALS DIVISION . . . WILMINGTON, DELAWARE

Buda Hydraulic Jacks

The Buda Co., Harvey, Ill., manufacturers of diesel and gasoline engines for trucks and buses, has announced the development of a complete line of hydraulic jacks ranging from 1½ ton to 20 ton capacity, and including a bumper jack of 1½ ton capacity.

Buda hydraulic jacks are finished in orange and black, and are said to contain many outstanding features. The ram and screw are made of specially heat treated steel, and are located in the center of the base of the jack, assuring perfect balance. Because of their improved construction, Buda hydraulic jacks said to be leak



proof—there are no "blind" plugs and no joints to loosen and leak.

Attractive display stands have been prepared for jobber use. For complete information write the manufacturer, requesting Bulletin No. 946.

SPEED-UP REPAIR WORK

with a bench that goes to every job

Just consider the time and trouble you can save with a work-bench that can be moved right beside the car that's to be repaired.

"HALLOWELL"
Semi-Portable
STEEL WORK-BENCH

gives you this convenience. It's a strong all-steel work-bench with a smooth top that can't get oil soaked and can't splinter. You push around like a wheelbarrow with the two handles that swing safely out of the way when not in use.

Fig. 992

Fig. 1112

KEEP TOOLS HANDY..AND SECURE
with the "HALLOWELL" Steel Tool Stand

A sturdy cabinet type stand, totally enclosed, but with perforated sides that allow full visibility of contents. Tools can be kept safely under lock and key, yet can be reached without fumbling around. Space on top where vise can be attached. Easy to move, as it has wheels and handles like work-bench above.

A SMOOTH WORKING SURFACE
That Can't Soak-up Oil

The all-steel construction of the "Hallowell" Bench makes it ideal for garage and repair shop use. The smooth top can't splinter or split from heavy parts being dropped upon it or pushed across it.

"HALLOWELL" STEEL WORK-BENCH

The strong leg construction assures long wear with permanent rigidity for precision work. Over 1300 combinations to choose from.

Fig. 732
Pat'd and
Pats. Pending

Drawer is Extra

STANDARD PRESSED STEEL Co.

BRANCHES BOSTON DETROIT INDIANAPOLIS — JENKINTOWN, PENNA. Box 561 — BRANCHES CHICAGO ST. LOUIS SAN FRANCISCO

Send me full information about:

☐ "Hallowell" Semi-Portable Steel Work-Benches
☐ "Hallowell" Steel Work-Benches ☐ "Hallowell" Steel Tool Stands

Mr. ..... Title .....

Firm .....

Address .....

Auto-Lite's New Spark Plug Cleaner

A new spark plug cleaner which cleans all size plugs has been introduced by The Electric Auto-Lite Co., Toledo, Ohio. The cleaner features control of air pressure by means of button piston valves, and uses a new Ziramic cleaning compound which is ground and screened to a definite grain size. It is claimed that this compound does an efficient and less harsh cleaning job than other compounds, and will not injure electrodes or insulators. The nozzle is easily changed, and a newly designed venturi offers a wide pressure operating range for all types of plug conditions.

The new Auto-Lite spark plug cleaner is housed in an ultra-modern cabinet and in size is 9¼ in. x 9¼ in. x 19 in.

Flashlight Tests Headlight Bulbs

A new product known as the Flash-tester has been announced by the Tung-Sol Lamp Works, Inc., 95 Eighth Ave., Newark, N. J. It looks and operates like a regular flashlight, but

has a pair of contacts at the side which are designed to test headlight bulbs. Any style of lamp bulb can be tested—if the bulb is burned out nothing will happen, but if the bulb is good the flashlight bulb will light.

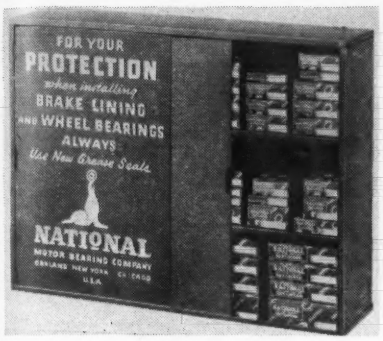
Tire Weight Increases

The weight of the average automobile tire has increased from 15.4 pounds in 1922 to approximately 27.8 pounds this year, according to Commerce Department calculations. Rubber and cotton comprise about 65 per cent of the content of the average tire, the per cent of cotton having declined and the per cent of crude rubber having increased with development of the balloon casing. In today's tire with an average weight of 27.8 pounds are 13.73 pounds of rubber and 4.37 pounds of cotton.

Merchandising Aids

(*Continued from page 33*)

diser which is said to be especially practical for modern brake service station requirements. It contains 116 super-service National grease seals,



all carefully charted for easy selection for any 1930-1938 car. Ample room for extra stock is provided in its generous 28 in. wide, 22 in. tall and 8 in. deep size. The cabinet is all steel, finished in red enamel.

As the first gun in its campaign to help dealers sell more brake jobs in 1939 and improve their service to car owners, the Raybestos Division of Raybestos-Manhattan, Inc., Railroad Ave., Bridgeport, Conn., is distributing all over the United States the

"Pull a Wheel" poster illustrated here. The new campaign is scheduled to break shortly after Jan. 1st., and will call attention of car owners to the necessity of having a wheel pulled to determine the condition of the brake lining.

DOING THE HARD JOBS EASILY

At a Profit . . .

● Yes, Atkins Hack Saw Blades of the famous "silver steel" are not only easier but more profitable to use . . . because the easier any job is done the less it costs. Cutting the new alloy steels in the many shapes called for today is a job which does not feaze Atkins Blue End Blades. Not only are they made of metallurgy's finest saw steel but the teeth are strong, sharp and evenly set. They are used everyday in shops of all kinds to cut any metal *any other hack saw* will cut, and many metals other blades can scarcely scratch . . . You pay no premium of extra price for this superior performance. Get them from your jobber.

E. C. ATKINS AND COMPANY
423 S. Illinois St., Indianapolis, Ind.

TEETH THAT BITE

ATKINS
Silver Steel
SAWS

CERTIFIED SAWS, SAW TOOLS, MACHINE KNIVES, ETC.

The Simmons Mfg. Co., Ashland, Ohio, is making a special offer to supply free a muffler display stand with the purchase of 10 mufflers other than Ford and Chevrolet numbers. This display stand is attractively finished in two colors, easily assembled, and designed to hold six mufflers. For detailed information, write the manufacturer.

The Thermoid Company enters the second year of its Preferred Dealer Program with new advertising and merchandising material. Outstanding among the new material available to Thermoid preferred dealers is an attractive four-color, all-metal awning which can be arranged over the dealer's equipment in his shop to set aside and identify the Safety Service Department. A complete new set of advertising material for use by dealers at official car inspection times (including a window poster and mailing cards) new blotters to enclose with statement mailings, six new cards for dealer use in conducting direct mail campaigns and two impressive 1 x 5 ft. metal doorway signs, are among the other new material.

The Thermoid Preferred Dealer Operating Manual, entitled "How To Make More Money Selling Brake Service," has been refined and expanded for 1939 to include new suggestions on sales methods.

MOTOR AGE

—is a publication keyed directly to the needs of the maintenance field. Built on the requirements of the serviceman. Edited by Bill Toboldt. Read it every month.

A Chilton Publication

CHESTNUT AND 56TH STS.
PHILADELPHIA, PA.

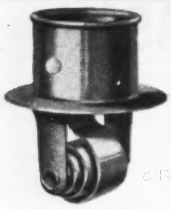
A LINE
YOU NEED
FOR PROFIT

Flare

COMPLETE AUTOMOTIVE CHEMICAL LINE

HYDRAULIC BRAKE FLUID —one item from this remarkable line. Made of the highest grade vegetable oils. Mixes with any quality brake fluid. Containers sealed for customer protection. The choice of thousands of satisfied users.

FLARE (formerly Flash) LABORATORIES 1858 West Kinzie Street CHICAGO, ILLINOIS



A Regular
EXTRA PROFIT
DOLE

Replacement and Special Hot Water Heater
THERMOSTATS
THE DOLE VALVE COMPANY
1901-1941 Carroll Ave., Chicago, Ill.

BUELL
AIR HORNS

The finest warning signal made—Musical, but Powerful—Instant Response, but delicate when desired.

Sound Range 1 to 10 Miles.

New Remote Controlled Spot Light Ready. Avoids drilling car body.

Write for literature.

BUELL MANUFACTURING COMPANY
2983 Cottage Grove Ave., Chicago, Ill.

For running-in new and rebuilt engines use auxiliary lubricants containing "dag"* Brand colloidal graphite.

Acheson Colloids Corporation
Port Huron dag Michigan

*REG. U. S. PAT. OFF.

WEED
AMERICAN
BAR-REINFORCED
TIRE CHAINS
the most necessary winter accessory

AMERICAN CHAIN & CABLE COMPANY, INC.
Bridgeport • Connecticut

"Fluid Drive"

(*Continued from page* 21)

steel parts. The forgings used in the unit consist of the hubs for the impeller housing and the runner. The large outer housing and the runner disk are made of pressed cold-rolled steel. The vanes, 22 in the impeller and 24 in the runner, are made of stamped, cold-rolled steel. They are permanently assembled into the impeller and runner disks by three spot welds on each vane.

The runner disk is permanently riveted to the runner hub. The runner is mounted in the impeller on a ball bearing, located in the forward part of the assembly. The runner is supported in assembly by the transmission drive pinion shaft.

The oil used in the fluid coupling is a low viscosity mineral oil known as industrial white oil. It provides the lubrication required by the bearing enclosed with the coupling, and it will pour at the lowest anticipated temperature. Moreover, mineral oil has no corrosive effect on any of the steel parts comprising the unit.

Gunning with Gages

(*Continued from page* 11)

leaking economizer, or other carburetion defects that would result in too rich a mixture at higher engine speeds.

If the engine speed decreases when the idle mixture is adjusted first to the lean side and then to the rich side, it indicates that at high speeds the engine is receiving the correct portions of gas and air.

Another way of adjusting a carburetor is to adjust it to the highest reading of vacuum or tachometer with the engine operating at a speed of about 45 m.p.h. After making the adjustment the engine speed is reduced to idling. Then, if the engine speed can be increased or decreased by changing the idling adjustment, it indicates that either too much or insufficient fuel is being supplied at the higher engine speeds.

A vacuum gage can also be used to locate a burned out carburetor heat riser. This will generally show up by poor idling with a low vacuum gage reading. In addition, as the throttle is opened, the vacuum gage reading will increase.

Sure-Plate Package Changed

Sure-Rite Products Corp. has announced that Sure-Plate, a compound for replating headlight reflectors, has changed its packaging. The product no longer is supplied in bottles, but instead is now available in cans. The change is said to be due to the fact that the cans are easier to handle and less subject to breakage.

Maintenance Men
who read
MOTOR AGE
Account for
85% plus
of all the business
done in this
Important Field

FAST-MOVING MONEY MAKER
NEW NOVEL
Emblemized KEY CHAIN

Genuine Catalin with antique bronze medallion insert of St. Christopher, Masons, Knights of Columbus and Shrine. Available in natural onyx, beige, Brazil onyx, Morocco red and mottled gray. 24 on an attractive 3-color display card. Write today for details.

Retail Price
25¢ each
Liberal Discounts

SINKO TOOL & MFG. CO.
351 N. Crawford Ave.
CHICAGO, ILL.

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VELLUMOID

VELLUMOID Gaskets and Sheet Packing are built to stand the gaff! Always ready for use, no shellac is required. Ask for, and be sure you get genuine VELLUMOID.
THE VELLUMOID CO., WORCESTER, MASS.

ALL WAYS

● Made only of the best materials . . . by modern methods exclusive with this company . . . Gardiner Acid Core Solder assures the dependable results, maximum economy and consistent performance so important to car manufacturers, body builders, garages and repair shops.

Its quick acting flux permits fast, clean work. Unusually high tensile strength insures lasting bonds. Yet Gardiner Solder costs less than "nameless" solders that lack its advantages of high quality and dependability.

The Gardiner quality line includes Acid and Rosin Core Solders, Solid Wire, Bar and Body Solders . . . also Permanent Lining Babbitt metal. For best results . . . always and all ways . . . specify Gardiner-made products.

Gardiner METAL CO.

4839 S. Campbell Ave., Chicago, Ill.

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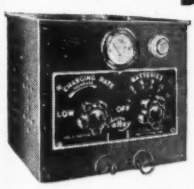

Valley Battery Chargers quickly repay their low first cost in added profits. Fully guaranteed for two years.

Model G-12 charges 1 to 12 6-volt batteries.

Now Only $25.00

Other sizes at equally low prices. Write for free bulletin.

Valley Electric Corp.
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- FOUND -

A tool that loosens corroded cylinder head studs in minutes - not hours. The National Hydraulic Action Tool has a hollow base which screws on stud, seating itself firmly on cylinder head. Half-fill with oil, insert plunger, strike with hammer - - and the stud is ready to turn out.

557 (3/8" - 24 thread) 75c
557A (7/16"-20 thread) 80c
557B (1/2" - 20 thread) 85c

NATIONAL MACHINE & TOOL CO.
JACKSON, MICHIGAN

Perfect Circle Announces Personnel Changes

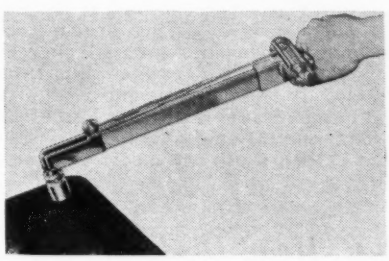
Several major changes have just been announced by Don H. Teetor, general sales manager of the Perfect Circle Co., effective Jan. 1. Wallace Harkrader, for many years field sales manager with offices in Hagerstown, Ind., will become a divisional sales manager, with headquarters in Los Angeles. Mr. Harkrader, who has been associated with Perfect Circle since 1922, will supervise the four Perfect Circle territories west of the Rocky Mountains.

J. C. Hamilton, formerly a district manager in the Kansas City territory, becomes field sales manager with headquarters in Hagerstown, Ind. T. R. Bradshaw, who has been the Perfect Circle service manager for the past few years, becomes field service manager, and will have headquarters in Hagerstown.

A. H. Webber, formerly district manager of the territory embracing Southern California, Arizona, and a part of Nevada, has been transferred to the Kansas City territory formerly supervised by J. C. Hamilton. The sales personnel in all other territories remains unchanged.

Torkflash Wrench by Blackhawk

The Blackhawk Mfg. Co., 5325 West Rogers Street, Milwaukee, Wis., has developed a new torque indicating wrench known as Torkflash. This wrench has several unusual features. The dial, located in the handle, has five scales which can be used simply by turning the knob to bring the desired scale up under the pointer. The scales available are: inch pounds, foot



pounds, direct pull for spark plugs, direct pull for SAE bolts and nuts, direct pull for USS bolts and nuts. The long pointer is set for the desired pull, and when this pull is exerted on the handle, a light in the end of the dial cylinder lights. No scale to read while pull is being exerted.

Special introductory offer includes a bakelite box in which to keep the Torkflash. Net price to mechanics, $9.60.

Zecol Has New Cleaner-Polish

Zecol, Inc., Milwaukee, Wis., has announced a new automotive cleaner and polish known as Half and Half. This new product is said to clean faded, oxidized finishes quickly and easily, leaving a deep dry lustre, cleaning and polishing in one operation, and in a fraction of the time formerly required.

All "KING" Testers when COMPARED on PERFORMANCE and PRICE are Real BARGAINS

The "KING" MT-200 WITH EXHAUST GAS ANALYZER $240.00

SOLD ON DEFERRED PAYMENTS

When buying testing equipment you naturally want to get the most for your money and for that reason you should find out what the "KING System" of Motor Tune-up offers you. We know that "KING" Testers will do ANYTHING other makes will do and also many things NO OTHER make can do. We know that anyone comparing testers—point by point and dollar by dollar—will appreciate that "KING" Testers are REAL BARGAINS. The "KING" MT-200 will make, among others, the following tests: Exhaust Gas, Coils, Relays, Generators, Fuel Pump, Carburetors, Ignition, Spark Plugs, Condensers, Cut-outs, Voltage Regulators, Timing, Ground, Continuity, Cables, etc. You can test coils on or off the car with or without engine running.

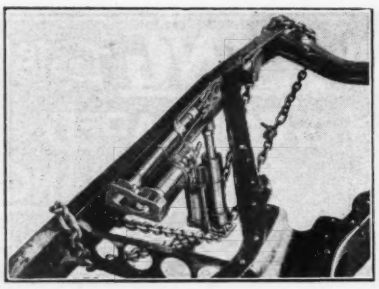
The New "KING" R. P. M. Indicator

The "KING" Electro-Tach (or R. P. M. Indicator) and Exhaust Gas Analyzer is a new piece of equipment that simplifies the timing of the ignition, carburetor adjusting, setting governor, voltage regulator and cut-outs. It will show increased R. P. M. after proper tune-up. It requires no balancing or disconnecting of any wire. It is automatically converted into a quick acting Exhaust Gas Analyzer by turning a switch, and the meter indicates both air fuel ratio and percentage of combustion efficiency. The "KING" Electro-Tach and Exhaust Gas Analyzer sells for $80.00 complete. We also offer a smaller "KING" Electro-Tach for $37.50 and a companion Exhaust Gas Analyzer unit for $34.00. Both are provided with hangers.

Ask your Jobber or Write us Jobber's Name

The ELECTRIC HEAT CONTROL Co.
9123 INMAN AVE. CLEVELAND, OHIO

KING-Good Products Since 1914-KING



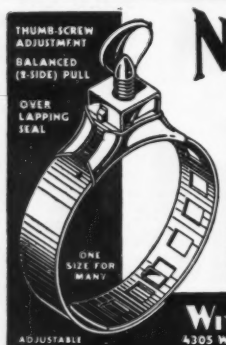
POWER PLUS
Makes Quick Work of
DROPPED FRAMES

Perfection POWER PLUS Hydraulic Jack makes quick work of frames which have dropped at the point where the X joins the channel by laying in the channel and extending the frame to its original position.

You'll find Perfection POWER PLUS' two modern hydraulic units make quick work of all body aligning, frame work, fender straightening, rear axle housing, bumper straightening, knee action adjustment, steel running boards.

The only double acting PUSH-PULL hydraulic jack, Perfection POWER PLUS gives you Speed, Power, Dependability, Accessibility, Adaptability throughout.

G. A. C. MANUFACTURING CO.
ASHLAND, OHIO



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HOSE CLAMPS

THE HOSE CLAMP WITH THE THUMB SCREW

Seals absolutely against leakage of anti-freeze radiator connections, or heater hose. Type A, Adjustable, the clamp with the thumb screw. 1 size fits many. Type GHH for heater hose. Type GBB for booster brakes.

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TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

RIMAC **TAPS & DIES**
Hexset **USE WITH DIE-STOCK, WRENCH OR RATCHET**

All Dies 1" Hex Outside — gives good wrench grip. Tap wrench has ⅜" square opening at tap and can be used with ratchet as extension handle.

Set complete — 11 Taps, 11 Dies, 5/16" to ½" S.A.E. and U. S. S.: ⅛" Pipe, 9" Die Stock; Tap Wrench.

Set No. 77

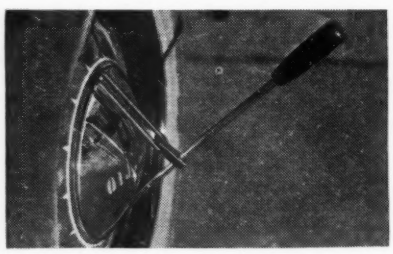
DEALER NET PRICE $8.50
Rinck-McIlwaine, Inc. **New York**

Mathews Elected N.S.P.A. President

Lester Mathews, assistant treasurer of the Sealed Power Corp., Muskegon, Mich., was elected president of the National Standard Parts Association at its convention during the Automotive Service Industries Show in Chicago. Other officers elected were V. C. Anderson of Chicago, senior vice-president; and Burke Patterson of Cleveland, junior vice-president.

Removes Hub Caps

A new tool for removing hub caps without damaging the cap or the paint on the wheel has been developed by the Wecco Mfg. Co., Owings Mills, Md. Known as the Giffy-Kap Remover, the tool consists of a straight bar of highly polished steel with a wooden handle on one end, the other end being shaped



to conform to the contour of the cap. On the bar is a sliding bracket containing two hooks which fit over the top edge of the hub cap, as illustrated. A steady downward push on the handle pulls the hub cap out of the wheel hub. For further information and prices, write the manufacturer.

P.C. Head Discusses Profit Sharing Plans

Lothair Teetor, president of the Perfect Circle Co., Hagerstown, Ind., told a Senate Finance Sub-committee recently that his company had operated profit sharing plans in plants in Newcastle, Hagerstown and Tipton, Ind., but discontinued the policy after the CIO union had made demands for wage increases comparable to the profit sharing dividends. He attributed the failure of the plan to "hatred" caused by industrial conflict and the failure of workers to recognize the fairness of the profit sharing system to both themselves and their employer.

Urging that business be permitted to develop profit sharing systems without government regulation, Mr. Teetor said:

"The plan has no place on the statute books in this country. To treat the problem as a legislative matter would be to bring fresh turmoil to business."

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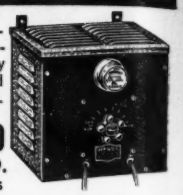

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The Simmons Mfg. Co. • Ashland, Ohio

Dayton Plans Track Revamp

The Dayton (Ohio) Speedway will be converted into a bowl shaped oval for the 1939 season, it was announced by officials of the Central States Racing Association after sanction for the summer's program was granted to an unidentified promoter. The track was purchased at auction for an unrevealed amount by a Dayton attorney. The attorney and officials of the CSRA said they were not at liberty to immediately disclose the buyer's name. They insisted, however, that he is nationally known as a veteran auto race operator.

Work on the track and on enlarging the grandstand to seat 25,000 persons is planned for the first break in the weather. An early spring opening is scheduled.

Carbon Clutch Bearings

A complete line of carbon clutch release bearings for all popular make cars using this type of bearing has been introduced by The Ohio Carbon Co., 12508 Berea Road, Cleveland, Ohio. These bearings are impregnated for quiet operation, and are said to be unusually tough for long wear.